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DEPARTMENT OF AGRICULTURE

KENYA COLONY.

IMPERIAL BUREAU OF MYCOLOGY

ANNUAL REPORT

for the nine months ending

31*st December* 1921.

NAIROBI.

PRINTED BY THE SWIFT PRESS, LTD.

1925.

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STAFF LIST OF DEPARTMENT OF AGRICULTURE

as at 31st December, 1921.

DIRECTOR.

Alex Holm, F.H.A.S., M.R.A.S.E., S.E.A.C. (Dip Hons.)

DEPUTY DIRECTOR.

E. Harrison, M.S.A., B.Sc. (Agric.) N.D.A. (Hons.)

1. ADMINISTRATIVE AND GENERAL.

Personal Assistant to Director and Advisor for Tobacco.	C. J. Monson.
Statistical Officer	L. D. Carpenter.
Accountant	H. S. Land.
Office Superintendent	W. W. Wilson.
Clerks :—	F. Parker, J. Mortimer, E. W. McLachlan, R. J. Philip, W. J. Phillips, R. F. Dalzell-Armstrong, R. Abram, G. V. Merriman, S. W. Austin.
Senior Coffee Officer	A. D. le Poer-Trench, Dip O.A.C.
Senior Flax Officer	W. G. Scott.
Flax Officers	G. M. Hamilton and J. J. Hughes.
Plant Import Inspector	C. C. T. Sharpe.
Agricultural Instructor	J. W. Sparrow.

2. DIVISION OF TROPICAL AGRICULTURE.

Manager, Mazeras Experiment Farm	F. B. L. Butler (Acting).
Officer in Charge Kibos Experiment Farm.	H. H. Holder.
Foreman Plant Instructor	J. B. Dopwell.

3. DIVISION OF BOTANY.

Mycologist	J. McDonald, D.F.C.B.SC., (Hons.)
Plant Breeder	G. L. J. Burton, M.C.,B.A.

4. DIVISION OF ENTOMOLOGY.

Chief of Division.	T. J. Anderson, M.A.,B.SC. (Hons Edin) F.Z.S., F.E.S.
Entomologists	H. Wilkinson, A.R.C.SC. and H.E. Box.

5. NAIVASHA STOCK FARM.

Manager	J. H. D. Beales.
Stockmen	J. Forsyth & A.E. Dircks.

6. KABETE EXPERIMENT FARM.

Manager	J. Johnston, B.SC., N.D.A., PA.S.I.
Assistant Manager	C. B. Armstrong.
Clerk and Storekeeper	J. D. Ritchie.

VETERINARY.

1. ADMINISTRATIVE AND EXECUTIVE.

Chief Veterinary Officer	W. Kennedy, D.S.O., M.R.C.V.S.
Deputy Chief Veterinary Officer	A. G. Doherty, M.C., M.R.C.V.S.
Senior Veterinary Officers	H. H. Brassey-Edwards, M.R.C.V.S.
	O. Dixon, M.C., M.R.C.V.S.
	R.C. Wheeler, M.B.E., M.R.C.V.S.
Veterinary Officers.	A. W. Carter, M.R.C.V.S.
	M. M. Reid, M.R.C.V.S.
	J. N. Cooper, M.R.C.V.S.
	G. B. Purvis, M.R.C.V.S

	R. S. Little, M.R.C.V.S., D.V.S.M.
	R. L. Creery, M.R.C.V.S.
	W. E. Phipps, M.R.C.V.S.
	E. J. Mulligan, M.R.C.V.S.
Chief Quarantine Officer	C. A. Neave.
Office Superintendent and Assistant Accountant	A. C. Hunter.
Permit Officer	J. B. Banks.
Registrar of Brands	J. E. Harrison.
Stock Inspectors	H. G. Ulyate,
	E. E. Blayden-Taylor,
	D. Wyartt,
	A. Littlewood,
	R.A.C. Campbell,
	W. L. Lewis,
	G. White,
	E. Evans,
	J. Mackay,
	L. E. Smith,
	R. J. Knobel,
	H. G. Chapman,
	H. Thorne.
Clerks	R. W. Hawkins,
	J. L. Byrne, M.C.

2. LABORATORY.

Chief Veterinary Research Officer	J. Walker, M.R.C.V.S.
Assistant Chief Veterinary Research Officer	W. Kearney, M.R.C.V.S.
Research Officers (Acting)	T. C. Bradshaw, M.R.C.V.S.
	S. H. Whitworth, M.R.C.V.S., B.V.S. (Melb).

2. LABORATORY.—(*Continued*).

Laboratory Superintendent	A. Walker.
Laboratory Assistants	J. T. Schultz, J. Ford, H.J. Gray, T.A. Goodwin. P. H. Poolman, J. R. Mcqueen.
Overseer.	J. Burton.
Yard Foreman.	A. Wight.
Clerks.	L. Myers, A. R. Ballot. W. White, A.E. Johnstone. A.J. Kemp.
Mechanic.	O. Stenmark.
Storekeeper.	J. Scott.
Assistant Storekeeper.	G. W. Clockley.

COLONY AND PROTECTORATE OF KENYA.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

Nine Months ended 31st December, 1921.

REPORT OF THE ACTING DIRECTOR.

STAFF :

The principal Staff changes, and new appointments during the period covered by this report were :—

New Appointments :— C. C. T. Sharpe (Plant Import Inspector), H. E. Box (Entomologist), R. Abram (Clerk).

The following Officers proceeded on leave pending termination of their appointments.

C. B. Ussher,	Horticulturist.
A. J. Wilson, M.C.,	Manager Kabete Farm.
R. J. Philip,	Clerk Head Office.
W.J. Phillips,	do. do.
A. H. Wilson,	Late Temporary Plant Import Inspector.

Mr. T. D. Maitland, Chief Economic Plants Division proceeded on leave pending transfer.

The appointment of the Dairy and Pig Officer (The Hon. H. J. Hepburn Scott) terminated during the period under review.

A New appointment to the Staff of Veterinary Officers was made as follows :— E. J. Mulligan, M.R.C.V.S.

Veterinary Officer A. S. Mathias was granted a transfer to the Nyasaland service.

Mr. R. Kerr, Mechanic at the Veterinary Laboratory was invalided out of the service.

FINANCIAL:

Statements of Expenditure and Revenue are shewn hereunder. The figures are approximate as at the time of going to press the accounts have not been closed.

Expenditure 9 months April/December, 1921.

AGRICULTURE:—

	Amount. Sanctioned. £.	Amount. Spent. £.
Administrative and General	17,895	19,106
Tropical Agriculture Division including Kibos and Mazeras Farms	4,377	3,212
Botanical Division	1,792	1,012
Entomological Division	2,620	2,560
Naivasha Stock Farm	4,056	3,991
Kabete Experimental Farm ...	5,658	5,493
Uasin Gishu Experimental Station	3,390	1,775
Miscellaneous.		
Agricultural industries and development	629	557
Contribution to Imperial Bureau of Mycology	100	100
Contribution to Imperial Bureau of Entomology.	300	300
Grants-in-Aid to E.A. Horticultural and Agricultural Society	600	500
Veterinary Division ...	37,257	31,212
Maintenance of Quarantine Stations	8,509	6,210
Veterinary Research Division	28,158	23,700
Total Agricultural Department	£115,341	£99,728

SPECIAL EXPENDITURE:

Continuation of Dipping Scheme	4,439	3,400
Establishment of Quarantine Stations	1,841	310
	£6,280	£3,710

The savings on the sanctioned amounts are chiefly due, to certain posts provided for not being filled suspension of work at Uasin Gishu Experimental Station and the restriction of operations of Quarantine Stations, on account of outbreaks of Pleuro-pneumonia and a smaller demand for trade stock.

Revenue 9 months April/December, 1921.

	Revenue. Estimated.	Revenue. Collected.
AGRICULTURE:		
	£.	£.
(a) Sale of Farm Produce and Stock	9,000	7,150
VETERINARY:		
(b) Testing, Dipping Fees, etc.,	25,000	10,100
VETERINARY RESEARCH:		
(c) Sale of sera, vaccines, etc.,	13,000	7,600
	£47,000	£24,850

(a) The decrease is chiefly due to poor prices realised at Live Stock Sales.

(b & c) Decrease owing to general trade depression. Withdrawal of charges for Pleuro-pneumonia inoculations and outbreaks of disease in native Territories resulting in prohibition of cattle trading.

General. The depression referred to in the last issued Report became acute during the year and much disappointment was felt by Settlers who had come into the country on the bubble of inflation. As the process of deflation progressed their assets depreciated and at the same time their prospects diminished. As in most countries the primary producer, was the first to suffer and the buying power of country produce became less and less until inactive markets with nominal quotations arrested enterprise. The tardy reductions in Ocean freights, still in the process of being scaled down to adjust to the altered trade conditions did not allay the despair of settlers and merchants, the excessive cost of transportation, both on land and on sea striking all producers with dismay. Fortunately these charges appear to be passing, but the rapacity of those workers whose only asset is their labour has had a serious effect on the fortunes of the more enterprising members of the Empire Community, whose ventures have absorbed capital and labour through these troublous times without any real return.

Kenya, however, on account of its inherent fertility and the virility of its inhabitants should recover rapidly, the wonderful resiliency of Africa should not be forgotten when depression assails.

The producer, in addition to high value crops such as Coffee or Flax, will need to develop bulk export of cheap raw materials such as Maize, Simsim, Cotton, on which Railroads and Shipping Lines rely for that high pressure working which cuts costs. On such cheap productions in time industrialism may be built; but the conditions must first be made attractive to capital for investment in industrial enterprise. The value of tonnage of cheap basic raw materials will be everywhere reflected in lower unit working costs throughout the country.

Again the local production of materials at present imported annually such as Sugar (£100,000) Flour (£120,000) Rice (£70,000) would go a long way towards assisting the trade balance of Kenya to take a favourable turn.

Capital cannot long continue to be put into a country without adequate return, and attention to the local production of Agricultural commodities at present imported is necessary if solvency is to be maintained. It is realised that to judge the wealth of a country solely by its exports is unsound, but a careful analysis of its imports in conjunction therewith gives a fairly direct indication of its capacity. A study of Kenya imports reveals the possibility of internal development for the local markets, the which is being tackled by enterprising people. The Agricultural development of any country is a slow process, but such work once soundly carried out is significant over a long period of years. A spirit of pride in the Colony and its advancement should be engendered.

The European producer is present in numbers so small in comparison with the extent and resources of the country that a big advance in development and production cannot be expected until conditions become attractive for a further influx; but the valuable and extensive area in occupation of a large native population points to the possibility of early production on a large scale.

The prosperity of both communities is interdependent. The Indian as a producer is not significant at the moment. The reference to Co-operative enterprise and the need for a Loan Bank to foster Agricultural industrial enterprises such as Mills, Creameries, and Bacon factories made in the preceding Report, is pertinent; but the uncertain conditions existing in world markets, excessive freights and labour charges, coupled with the knowledge that elsewhere many industrial efforts have failed through too early attempts to establish them, undoubtedly acts as a deterrent.

Crops :—The farming year under review has been a difficult one.

Coffee prospects were good but not realised. Unpropitious weather conditions in the principal producing areas increased the amount of "Buni" with a corresponding reduction of the mature crop.

Maize yields per acre were low.

Flax yields shewed considerable reduction, the dry weather also prevented the retting of the straw so that the output of finished flax and tow was abnormally restricted.

Wheat, on the other hand shews an increased acreage and with the general desire for better quality, greater attention is being paid to essentials.

Pastoral conditions for Sheep were very favourable, in some districts Cattle suffered on account of drought. Losses from disease were normal.

Owing to unfavourable weather conditions in the Native Reserves a general shortage of return from Agricultural work was manifest, practically all being seriously affected; this, coupled with inability to dispose of livestock and hides, owing mainly to bad trade and to a small extent Quarantine regulations, has affected the purchasing power of the native population.

AGRICULTURAL LEGISLATION:

A Bill to provide for the Grading and Inspection of Agricultural Produce to be exported was passed during the year.

A Select Committee investigated the position of Pleuro-pneumonia in the Colony and made certain recommendations which indicate that a campaign for the control and eradication of the Disease in the cattle in the Native Reserves is desirable. The Director acted as official member for Kenya on the Inter Colonial Railway Council.

EAST AFRICAN STUD BOOK:

The registration of Pure-bred stock proceeded; but no Volume was published there being insufficient entries to warrant same.

AGRICULTURAL CENSUS:

The second Annual Agricultural Census (1920-1921) as required by the Statistics Ordinance of 1918, has been completed and will form the subject of a separate publication.

The increase in areas cultivated and in Livestock compared with the previous Census figures is generally marked.

On the 30th June, 1921, there was a total area of 3,333,106 acres under occupation by 1,346 Owners or their representatives as against 3,157,440 acres and 1,183 on the 30th June, 1920.

The total area under cultivation by Europeans has increased by 30,669 acres. This area of 206,959 acres represents 6.21% of occupied area as against 5.58% for the previous year. These figures disclose sound progress in Agricultural activity generally, during the year under review.

A further estimated area of some 33,651,651 acres is under occupation by Natives, estimated production (surplus to district needs) and numbers of Livestock owned are included in the Census Report above referred to.

AGRICULTURAL EXPORTS:

A comparative statement shewing Quantity and approximate value of Exports from Mombasa of Agricultural commodities from this Colony for the periods 1913-14, 1919-20, 1920-21 (July—June) is appended.

Difficulty was again experienced in arriving at accurate figures of Export in respect of certain crops.

Uganda products imported via Kisumu may be held for a considerable period at the Port prior to shipment, as a result of which export figures from Uganda and Kenya less Uganda exports (through Mombasa) result in a temporary deficiency in respect of Kenya for some products.

COMPARATIVE STATEMENT SHEWING QUANTITY AND APPROXIMATE VALUE OF EXPORTS FROM MOMBASA OF AGRICULTURAL COMMODITIES FROM THIS COLONY AND PROTECTORATE OF KENYA FOR THE PERIODS 1913-14, 1919-20, and 1920—21, (July—June).

Figures supplied by the Honourable Commissioner of Customs.

		QUANTITY.			VALUE £.		
		1913-1914.	1919-1920.	1920-1921.	1913-1914.	1919-1920.	1920-1921.
ANIMALS LIVING :							
Cattle	No.	2,241	650	667	7,005	2,563	2,956
Sheep		564	164	256	350	143	322
Goats		6,228	1,881	3,198	3,274	1,539	2,663
Horses		11	2	2	282	67	100
Mules		11	—	—	253	—	—
Donkeys		2	2	8	12	5	30
Camels		4	1	23	18	5	137
Wild animals		24	147	19	225	176	714
Other sorts		90	—	121	419	—	403
Bacon and Ham	Cwts.,	9	5	303	56	38	3,438
Butter	Lbs.,	—	—	150	—	—	20
Cheese	Lbs.,	—	—	1,520	—	—	151
Coconuts	No.	160,564	110,120	147,568	610	473	788
Coffee	Cwts.,	4,748	66,150	127,366	15,694	201,150	464,169
Copra	Cwts.,	33,464	28,521	6,245	37,474	35,821	7,499
FIBRES :							
Sisal	Cwts.,	30,811	87,398	122,559	19,692	117,682	192,899
Flax	Cwts.,	—	8,234	9,129	—	11,071	14,583
Other sorts	Cwts.,	6,798	3,365	6,697	3,959	4,566	10,280
GRAINS :							
Beans & Peas	Cwts.,	27,983	74,578	6,348	10,534	47,551	8,692
Ground Nuts	,,	9,546	308	3,439	6,288	357	3,530
Maize	,,	176,646	292,961	134,442	33,102	101,480	47,616
Millet	,,	4,820	9,523	7,979	874	4,100	4,437
Sim-Sim	,,	47,604	23,372	28,581	37,356	18,396	30,734
Wheat	,,	—	312	435	—	688	494
Chiroco	,,	5,519	8,183	6,053	2,974	7,403	5,241
Other sorts	,,	1,297	998	178	536	531	259
Hides :—		2,917,056	32,063	4,087	124,237	42,937	10,038
OILS :							
Sim-Sim	Galls,	8,153	3,048	6,038	1,168	665	1,677
Potatoes	Cwts.,	39,114	33,558	78,721	6,585	10,472	8,042

RUBBER :							
Wild	Cwts.,	305	1,733	13	2,289	14,730	90
SEEDS :							
Castor	Cwts.,	162	440	212	168	572	286
Rubber	,,	20	—	—	75	—	—
Flax	,,	—	2	—	—	13	—
SKINS :							
Sheep	Cwts.,	1,040	296	202	1,540	505	816
Goats	,,	5,057	8,845	2,995	18,567	54,352	13,288
Wild Animals	No.	1,674	6,483	7,400	618	1,538	1,904
Tobacco :—	Cwts.,	54	181	103	97	405	331
Wattle Bark	,,	3,559	2,906	6,120	1,865	1,951	4,830
Wool	,,	2,082	3,071	1,362	9,718	14,576	13,345
			TOTAL :		£ 347,864	698,521	856,805

Excluding Cotton seed, Plantation Rubber and Ghee for which figures are unobtainable.

A substantial increase is observed in Exports of Coffee. Sisal, Flax and Pig Products, while it is useful to note that Butter and Cheese have made their appearance in the Export list—if only in small quantities.

While reduced figures of export under certain heads exist in comparison with 1919-20 figures, the total increased value of principal Agricultural exports redeems this feature.

LAND SETTLEMENT :

The main figures of settlement as enumerated in the 1920-21 Census shew progress and allowance must be made for those plantations temporarily and permanently abandoned—though happily there are few in the latter category.

The nett total of 163 new settlements during the year reviewed is sufficient indication that in spite of considerable agricultural depression, faith in the Agricultural possibilities of this Colony is maintained.

The price of land has declined somewhat, weak holders being forced to sell from time to time. The

fall in Land values is not unwelcome as it enables settlers to purchase land at a remunerative figure. The development of communications in the extension of the railway system and the provision of a Dock will encourage land holders to hold on and develop their properties. A big effort is required of our settlers in the production of large tonnages to enable the Government of this Colony to pay interest and redemption on the large development loan funds so generously provided. By such action, not only will they strengthen the position of the Colony; but more directly raise the value of their holdings.

During the year the Department administered the Grant for Agricultural training given to Disabled Officers by the British Ministry of Agriculture and Fisheries, particularly in reference to the B.E.A. Disabled Officers Colony, Kericho.

AGRICULTURAL SHOW : ...

The Agricultural and Horticultural Society of Kenya held its Annual Show at Nairobi in December, 1921. It was not found possible to furnish accommodation on the Nairobi Race Course for Cattle, Sheep and Pigs—they were therefore excluded from the Prize List. The support extended to all Sections catered for was satisfactory and particularly gratifying in view of adverse conditions and depression prevalent throughout the Country. The District Exhibit Section again formed the principal feature of the show, demonstrating the varied productivity of those Districts competing; whilst the support accorded to the Coffee Section exceeded that of all previous Shows. This Department again staged Exhibits of an educational character and illustrative of its activities; Lectures and Demonstrations upon various subjects were organized.

LIVESTOCK :

The following comparative table indicates the progress of the Livestock industry, shewing stock in the hands of the European Community.

LIVESTOCK.	1919-20.	1920-21.
Cattle. Total :—	137,604	161,210
Cows and Heifers over 3 years	40,163	47,298
Heifers over 1 and under 2 years	12,461	15,980
Heifer calves under 1 year	11,868	13,136
Bulls in use	1,162	1,430
Other bulls and bull calves	11,388	14,454
Oxen trained	45,426	49,800
Oxen other than trained ...	15,136	19,112
Horses	1,269	1,311
Mules	996	976
Donkeys	902	1,108
Sheep. Wool bearing Total :	89,454	98,168
Breeding Ewes	45,436	49,345
All others	44,018	48,823
Sheep—Native Total :—	11,802	16,136
Breeding Ewes	7,961	10,354
All others	3,841	5,782
Goats	2,654	4,323
Pigs Total :—	9,450	15,038
Breeding Sows	2,407	3,283
All others	7,043	11,755
Poultry	29,354	33,772

The above figures reveal an increase of 17.15% under total Cattle, and the percentage of classified stock shews a decrease of Native in favour of Grade and Pure-bred *i.e.* :—

	1919-1920.	1920-1921.
Native ...	43.42%	41.15%
Grade ...	55.66%	57.91%
Pure-bred ...	.92%	.94%

While it is difficult at this stage to recognise from available statistics a direct inclination in favour of Dairying in preference to Beef production, it can be said that this inclination exists. Dairy Produce is more readily obtainable locally in the "dry season" than of late years and the Export figures already referred to indicate the beginnings of a dairy products export.

The prospects of a Beef exporting Industry lie in the potentialities of the Native Reserves. The value of European settled land is already somewhat high for such a business to be sufficiently remunerative. The large undeveloped areas between Nairobi and the Coast are at present unsuitable in the main, owing to lack of water supplies and the presence of "Fly," ultimately such country will be developed to the great advantage of the Colony; but whilst more attractive areas remain to be opened up, one cannot expect much advance there.

Horse Breeding :—is a branch of stock raising almost entirely restricted to the racing and sporting sections of the community, the ordinary farm riding horse is usually procured from the Northern trader.

Sheep Breeding :—is restricted to certain areas of the Colony and progress represents the efforts of a comparatively small number of persons interested in this class of stock. This form of Live Stock farming should be more largely carried on. There should be a significant export of wool from Kenya.

Pig Raising: as an industry is advancing, particularly in point of numbers.

Census figures shew an increase under all heads of 59.13% with a total of 15,038 pigs as at 30th June, 1921. Increased output of Bacon and Bacon products is observed by the availability of the local product on the local market and the heavily increased export figures.

The following figures of Native owned stock are estimated and include (a) in Reserves (b) on European Farms the property of squatters and (c) owned by Indians.

Cattle	2,478,714
Sheep	2,703,399
Goats	3,891,091
Horses	48
Mules	218
Donkeys	26,778
Camels	101,760

MAIN CROPS :

The total area under crops in European areas as at 30th June, 1921, was 169,685 acres comprised as follows :—

	Acres.		Acres.
Maize	53,395	Brought forward	144,026
Wheat	7,858	Sugar cane	2,616
Barley	1,091	Coconut	10,120
Oats	900	Wattle	10,768
Beans	923	Rubber	2,571
Peas	149	Fruit	2,373
Potatoes	229	Vegetables	222
Lucerne	391	Cotton	26
Coffee	33,813	Fodder crops	597
Sisal	31,050	Miscellaneous	586
Flax	14,227	Total	173,805
carried forward	144,026	Less catch crops	4,120
		Total : Acres	169,685

COFFEE:

On the 30th June, 1921, the total area planted was 33,813 acres, of which 13,682 acres were under three years, 10,349 acres over three and under six years and 9,782 acres over six years. The actual yield of clean coffee was 89,850 cwts. and of recorded "Buni" 6,458 cwts. a lower production than that furnished by calculation. The considerable extension of this valuable agricultural industry is confidently expected and at this stage one is unable to put a limit to its development, which limit will be rather a matter of labour supply and its efficiency. The Coffee Officer attached to this Department, unassisted is able to carry out only a portion of the duties assigned to him, and the Regulations under the Diseases of Plants Prevention Ordinance cannot be fully applied. Such a valuable source of wealth to this Colony should not be neglected and no preventable risk should be run, recollecting the fate Coffee planting has met with in some countries. In order that the congestion of work should be relieved a Temporary Officer was employed on the Plateau and in the Trans-Nzoia area for three months. Considerable inspection and advisory work was performed by him and several public meetings were held.

During the year 307 plantations were inspected. Experimental areas on the manuring of coffee were established on Mr. Douglas Cooper's farm. Under control several new varieties of Coffee, akin to the Coffee grown in Kenya, are being tested. Throughout the Country the problem of shade is receiving close attention, most Coffee Planters have realised its importance and with so much practical interest being taken definite recommendations for the different districts will be possible in the future.

Attention has been paid to the development of new markets for East African Coffee, the chief being Egypt and Australia. The visit of the Coffee Officer to Guatemala and Costa Rica resulted in much valuable information being available to the Government and to Coffee Planters in Kenya.

FLAX:

26,475 acres were harvested during the period 1st July, 1920-30th June, 1921, and 14,227 acres were sown as at 30th June, 1921. To the latter area, however, must be added a further acreage ready for planting. In comparison with the yield of the previous year the actual quantity per acre harvested was generally low; but redeemed by good crops secured in individual cases. 107 Flax Mills representing 1,742 Scutching Wheels are recorded. This affords a sufficiency of plant to cope with the crop, actual and prospective, and is a large increase over last years figures. There is known to be, however, a heavy proportion of raw material untouched or in process of preparation throughout the country.

The scheme for the grading of Flax was put into operation and the greater portion of Kenya flax produced in 1921 came under the scheme. Grading is not compulsory. The system is somewhat laborious, but it is felt by those concerned that without grading the flax industry would have had difficulty in maintaining itself. On graded flax a local value may be placed and local sales or advances are possible.

District variations in Flax produced are marked. The unfortunate depression in the Linen Trade has had an unfavourable effect on Flax growing in Kenya. Depressed markets and the minimum of sales have constrained growers to produce at the lowest possible cost. A marked improvement in methods has been exhibited and the need for co-operation in Baling particularly is understood.

The importance of retaining the Flax growing industry in Kenya is realised and although the anticipated success attending its establishment has not materialised, it is an asset to the Country. Any crop which encourages settlement, even if only moderately profitable, is of considerable value and is worthy of public support.

Variety trials at Kabete carried through to the finished Flax and Tow are of great value—some valuable results have been secured.

Linseed may generally be sold at a price which will cover the cost of deseeding, cleaning and bagging, and growers should endeavour to market this valuable product. An attempt to spin Flax on old fashioned Spinning Wheels is being made with a view to the production of cable for Fishing nets.

Maize. The area of 30,846 acres was harvested and 164,722 bags produced, furnishing a Country average of 5.34 bags per acre as against the high country yield of 9.87 bags for the previous year. The comparison is that of a poor to an exceedingly good crop and results over a further period of years should furnish more realiable average yields.

53,395 acres were recorded under this crop as at June 30th 1921 and estimated to produce 384,059 bags or 7.19 bags per acre.

It is advisable that in the principal maize growing districts the aim should be to produce a white export maize. Although from time to time yellow maize commands a slightly higher price, yet on the average white maize will be the more satisfactory. The native as a producer of export quality maize is not yet a significant factor, but under control it is anticipated that he will contribute his share to the expected large excess production. Here one may mention the extreme importance of seeing that any grain shipped from Kenya is free from grain infesting pests; in order to hold a market once secured—uniformity, quality and cleanliness have to be practically assured.

SISAL.

The total area planted on the 30th June, 1921, was 31,050 acres, of which 15,380 had passed the age of 3 years. 24 Sisal Factories with an estimated output of 61.5 tons a day were established and in operation.

The quality of fibre is high, but the output of 123,820 cwts. during the twelve months reviewed (July 1920-June 1921) is but a reflection of the demand for the product. Higher prices would mean a greater

out-turn over a period. An opening for the production of Binder Twine certainly exists and the position should be examined and explored. At present some of the Sisal goes to Belgium via England and the product is shipped to Australia.

WHEAT.

During the year ending 30th June 1921. 4,999 acres were harvested, producing 12,913 bags, equivalent to 2.58 bags (8 Imperial bushels) per acre—a decided improvement over the previous year's average yield of 1.80 bags (6 Imperial bushels). 7,858 acres were planted as at 30th June 1921, estimated to produce 25,293 bags i.e. 3.22 bags per acre. It is interesting to note the increase in area of this crop and it is hoped that before long production will meet the requirements of the local population.

The chief difficulty, apart from "rust-proofness" is the provision of pure seed. In only a few instances are uniform samples produced adding greatly to the difficulties Millers meet in securing a suitable blend. The establishment of Milling capacity sufficient for local needs could be secured by the gradual prohibition of flour importation, whilst wheat grain could be admitted. Local flour production is a partially protected industry. The control of flour importation under the Defence Regulations 1921, published in Government notice No 187 dated 25th May 1921, was undertaken by the Department up till the end of November when control terminated.

BEANS AND PEAS:

These crops occupy a minor position at present in the European agricultural calendar. 1,007 acres were harvested during the twelve months ending 30th June 1921 and 1072 acres sown on the latter date. Leguminous Grain crops are utilised to a large extent by the European for catch cropping purposes or planted in small areas for the production of foodstuffs (posho) for

resident native labourers. The export trade which should become a large factor is handicapped by the presence of weevil and beetle. The absence of mechanical means of drying and sterilising is deplored.

POTATOES.

A small area of 229 acres only is recorded under European cultivation as at 30th June 1921.

SUGAR CANE.

As foretold in my preceding report a considerably increased area has lately been put under Sugar Cane. 2,616 acres were returned under this crop as compared with 691 acres previously. The industry is at present in the embryo stage and production returns are not of sufficient total reliability to warrant publication. Jaggery sugar only is produced from a portion of "Cut areas" while the balance of cane is utilised in extended planting and for barter to natives.

COCONUTS.

A total area of 10,120 acres, representing 521,967 palms or 52 trees per acre is recorded. Most of the plantations represented by this acreage are in the very early stage of production and this knowledge leads one to anticipate a further increased output in the course of a few years.

RICE AND COTTON.

These crops have to date received little consideration by the European community, precedence being given to the recognised "proved crops" with remunerative prospects.

As native agricultural products there is unlimited scope for development in the Lake region and certain areas of the Coast belt. It is, however, doubtful if any considerable planting in the Highlands will be contemplated in the early future—in competition with the more acceptable European crops.

HORTICULTURE.

Nearly every estate boasts its orchard of mixed fruits. A total area of 2,273 acres being computed as at 30th June 1921.

Commercial plantations under Citrus and other fruits exist in certain areas of the Colony and the most serious development may be attributed to the Machakos district, where excellent produce is obtained. The supply is restricted to local demand and the difficulties attendant on the establishment of an Export trade have yet to be overcome.

NATIVE AGRICULTURE.

Reference was made in the report for 1920 to the position of Native Agriculture and estimates of surplus production were tabulated, shewing a large output. The Department is becoming more and more interested in the development of the highly fertile Native areas and in order that the extent of the work may be envisaged the Reserves are being traversed and reported on from an Agricultural point of view. The importance of encouraging Native production in the Nyanza Province is fully realised. Here one finds a very large native population with excellent agricultural country situated at the Lake end of the Uganda Railway. That certain staple and export crops can be grown successfully has been amply demonstrated and it now remains to encourage extensive production of these crops. A scheme has been drawn up and put into partial operation, as Staff and funds permit extension will take place. The training of natives for this work is proceeding satisfactorily.

In the Kenia Province where the Kikuyu and related tribes are settled on some excellent country, partially served by Railways, a similar scheme is to be applied. In the past the Coastal Districts have received attention but owing to the reduction and withdrawal of staff no real work is being done there.

It is essential, if the natives are to take their proper place in the economic life of Kenya, that they should be made to utilise profitably those large sections of the country in which they are left in undisturbed peaceful possession. By co-ordinated effort between this Department and District Administrative Officers it is anticipated that much good will accrue, not only to the native but to the Colony.

ENTOMOLOGY.

The staff consists of a Chief with two Assistants and a clerk.

The usual and increasing amount of advisory work is carried on by corresondence. Fortyfour percent. of the time of the Technical Officers was spent in "outside work." A valuable exhibit was staged at the Nairobi Agricultural Show in December.

Particular attention has been paid to investigations on the life cycles of insects injurious to stored products. The produce of Kenya is prone to such attack and it is of very considerable economic importance that means be devised for minimising such loss.

"Fly" areas have been mapped and reports of fly in various areas investigated.

The ecto-parasites of rats, which parasites are responsible for the transference of Plague to Humans are under investigation.

Determinations of the distribution of ticks from collections made throughout the Colony have been carried out.

Investigations mentioned in the last report have been continued. Reference to the report of the Entomologist attached will reveal that much valuable work is being undertaken.

A large number of species were again added to the collection.

DIVISION OF BOTANY.

There are two Officers in this Division, the Mycologist and the Plant Breeder.

The former Officer is engaged in the determination of the Fungoid Pests which attack crops and in connection with these duties over 2,000 miles of travelling was done in districts of Nakuru, Solai, Njoro, Kericho and Nairobi.

No new fungoid diseases on crops grown for export were reported.

The amount of damage done by Fungi owing to the dry season was nowhere very great. During the year six diseases were noted to be present in Kenya for the first time; with the possible exception of Sisal Leaf Spot; none are new to science. The most important one is the Mosaic disease in Sugar Cane, which does considerable damage in other parts of the world. Experimental work in Water Retting of Flax with a view to ascertaining the cause of unsatisfactory results so far as obtained has been commenced in collaboration with the Flax Expert and the Director of Chemical Research.

FLAX WILT :

A Drying method of treatment of seed to kill spores is being sought for.

Spraying trials on Coffee with new mixtures has been carried out and a certain amount of work on "rust in wheat" has been done in co-operation with the Plant Breeder.

The usual routine work in advisory services, instruction at short courses, exhibits at the Agricultural Show, and Plant inspections has been performed.

PLANT BREEDER :

This Officer has been engaged on testing out wheat strains at Kabete and Njoro, and determining in various districts the relative incidence of the various types of "Rust in wheat."

The larger field trials for yields of typical wheats have been abortive on account of the drought experienced in both "rainy" seasons. However, sufficient work was done at Njoro and Kabete to form a firm foundation for future elimination and Breeding work.

The wheats of the country being so very mixed, and in certain areas so badly rusted, the problem of milling became acute. The flours produced from local wheats were not acceptable to the Bakers whose preference lay with imported flour because of its known and invariable qualities. Milling and Baking tests of typical productions were initiated and carried on with a view to :—

(a) Securing information regarding types to grow.
(b) Securing information regarding types to blend in milling to produce competitive flour.

Undoubtedly with selection and the provision of pure seed the wheat crop will take its place in the farming system of Kenya. Careful and steady work both in Hydbridising, selection on quality and yield will bring strains of high value to the Colony, enhancing its land value.

With Maize, the need for a short season variety of constant type for planting in reserves and on European farms is great and the zoning of the country from the point of view of Maize and Wheat varieties is aimed at. Much assistance has been rendered the Department by Mr. W. Sewall and Mr. E. H. Wright of Njoro, by Messrs. Unga Ltd., and firms of Bakers in Nairobi.

PLANT IMPORTS :

These all undergo inspection either at the Coast or in the Post Office, Nairobi, under the "Diseases of Plants Prevention Ordinance."

	No. of Packages.	*Value.*
1919—1920.	818	£ 3.712
1920—1921.	8,352	£43,181
June 1921—December 1921.	1,118	£15,004

The largest reduction was in Flax Seed of which the Colony is now able to supply its own requirements. Export certificates were issued when required for produce to the value of £25,000. Beans exported were in good condition and good quality. Maize, however, was mostly native, mixed and weevilly.

NAIVASHA STOCK FARM.

The breeding of improved stock for sale has demanded continual and close supervision and in respect of Dairy Breeds the milk records of Dams have been taken. This is most important work in connection with the anticipated future Dairy industry of Kenya; and Stockowners are urged to institute such record work on their farms where the quality of the stock is sufficiently good to make such efforts valuable.

The season was, however, unprecedently droughty; and great difficulty was experienced in maintaining the condition of the livestock. Owing to the record work above mentioned, hand-rearing of calves was resorted to and such hand-reared young stock has thriven better than those allowed to run with their dams.

The process of elimination of poorer stock has continued.

SHEEP :

This class of stock did well, as was to be expected under the dry conditions experienced. The numbers have been reduced and with regular dosing the incidence of "wire worm" and kindred diseases has been diminished. Scab has been almost entirely eliminated. Undoubtedly excellent work in building up herds and flocks which will be of great value to Kenya in the future has been done by the Manager and his Assistants

KABETE EXPERIMENT FARM.

The staff during the year has been much reduced and several officers are attached whose duties lie chiefly in the country districts.

INSTRUCTION.

An average of five students were in permanent residence throughout the year, representing seventeen individuals. A short Course of 14 days duration, attended by 16 students was held. The lines followed were those of previous courses. The work was much appreciated and the thanks of the Department are due to those Officers who so ably assisted.

CROPS AND EXPERIMENTS.

The unpropitious season so adversely affected the growth of crops that beyond maintaining seed the results of experimental work are negligible in so far as varieties of crops are concerned. A Pig Feeding experiment was commenced.

Work on Wheat and Flax is referred to in the reports of the Officers concerned.

STOCK.

The breeding of improved livestock, particularly cattle and pigs has continued.

CORRESPONDENCE.

A large volume of correspondence including much in the nature of agricultural enquiry has been dealt with.

GENERAL.

No addition of note was made to equipment and particularly to buildings. The farm is typical of much

country in Kenya but the facilities for real investigational work are sadly lacking. Adaptation and improvisation are additional to the difficulties encountered in running such a station where accuracy and depth in experimental work is essential for full value to be secured. On a modern Agricultural Experimental Station a steady positive progress can be seen only when there is a definite income available, a permanent staff and the vagaries of finance have no direct influence.

ELDORET EXPERIMENTAL FARM.

In view of the altered financial circumstances of the Colony this Station has been closed down.

TROPICAL AGRICULTURE.

The Chief of this Division, Mr. T.D. Maitland, took leave on transfer at the beginning of the period. The vacancy was not filled—the stations at Mazeras and Kibos thereafter fell under direction from the Head Office. The season was not a particularly favourable one for Agriculture at these Stations; but good work was done in raising a quantity of seed and plants for distribution and sale. The trials of a number of varieties of Sugar canes, which were kindly sent during the previous year by the Director of Agriculture Uganda were a special feature of the experiment work at Kibos, and it is hoped that the Cane growing areas in the Nyanza Province will ultimately benefit by the introduction of those canes which prove to thrive best in the conditions obtaining at Kibos.

The completion of a large Sugar factory in the neighbourhood is progressing and in addition another small plant has been started. On the whole, the demand for seed cane in the country during the later months has fallen off somewhat, partly doubtless owing to the dry season being unpropitious for planting; but probably the financial position deterred many Planters from expansion with a new crop from which it is a costly matter to produce the refined marketable article. Again

the deplorable manner in which the native population in certain areas makes use of sugar and sugar cane for the manufacture of intoxicating liquor, has raised the question as to the advisability of limiting the numbers of small factories on the borders of the Native Reserves. A series of trials on Native food grains was begun at Kibos for the purpose of testing yields and the milling qualities of such grain as M'tama.

The raising of pure maize and beans for distribution again received attention.

Work on Tobacco was abandoned as, owing to the financial position, provision had to be deleted from the Estimates. There is little of consequence to report regarding the Coconut Industry—trade was very depressed and progress was not marked. It has been found impossible to appoint another Tropical Agriculturist, and so the work of instructing natives on better methods of preparing Copra which has been carried on in the Coastal zone for some years past could not be continued to any great extent. The traps for Coconut beetles were discontinued as the Entomologist considered that they had served the purpose for which they had been instituted in proving that large numbers of these insects may be destroyed in this manner.

EXTENSION WORK IN NATIVE RESERVES.

In the Nyanza Province the Manager of the Kibos Station again made tours through the Reserves supervising the work of the Native Instructors who are stationed at suitable centres for the encouragement of the cultivation of Sim-sim, Cotton, Rice; Maize and Beans and other crops suitable for local consumption or export.

It is regretted that this Officer reports a growing disinclination on the part of the Kavirondo to produce Cotton as a principal crop. The low prices which have prevailed for a considerable period are almost certainly the reason, coupled with the fact that bad seasons require that a greater area be used for the production of food-

stuffs and the total area under cultivation declined during the war period when so many natives were away at the Front.

On the Coast the feature of the period was the continuance of the endeavour to induce natives to increase their Rice production where the conditions are favourable. An Officer was specially detailed for this work, demonstration plots were laid out and seed of the best local varieties distributed. The increase of our Rice production is considered a matter of prime importance. At one time large quantities were grown and the present unsatisfactory course of importing our grain from India must be altered. It is well known that the quality of much of the African Coast Rice is admirable, but the sparse population who are naturally indolent have gradually relaxed their efforts at production since the days of the old slave owners.

Generally throughout the Colony and Protectorate the Department has followed the previous policy of supplying good seed for the improvement of native grown crops and, when and where it possessed the means, instructional and advisory services were provided to aid the zealous efforts of the Administration towards the development of the Agriculture of our native peoples. It is a pleasure to acknowledge the co-operation so gladly rendered by the Officers concerned.

A Number of Karakul Rams and Grade Catalonian Donkeys were purchased by natives from the Naivasha Farm through their Administrative Officers.

An Ayrshire Bull was loaned to the Masai in the Ngong district for breeding purposes.

VETERINARY.

ADMINISTRATIVE AND EXECUTIVE DIVISION

During the period under review the post of Chief Veterinary Officer was filled, one Veterinary Officer was transferred to the Nyasaland service and one new appointment made, leaving the Staff of Veterinary Officers short of its full establishment by two units.

Twentynine outbreaks of Rinderpest occurred on European owned farms during the nine months under review as against fiftyfour in the previous twelve months. In dealing with these outbreaks 8,865 head of cattle were "double inoculated" and 6,507 were treated by the "serum alone" method. "Double inoculations" were commenced in the Uasin Gishu district in December and up to date, 4,366 head of cattle have been dealt with there. On December 31st five European Farms, the Nairobi Township and practically all the native reserves remained in quarantine for Rinderpest.

Pleuro-pneumonia continued to spread in the Native Reserves of the Nyanza Province and in spite of all precautions the disease spread on several occasions from native areas to European-owned farms. The position with regard to this disease became so grave that a Special Committee of the Legislative Council was appointed in October "to examine and report upon the position in respect of bovine pleuro-pneumonia and to make recommendations regarding the steps which should be taken to deal with it." The report of this Committee will be published shortly. During the past nine months 34 outbreaks were dealt with on European owned farms as compared with thirtysix in the previous twelve months. In dealing with these outbreaks over 30,000 head of cattle were vaccinated against the disease with "culture" vaccine. The total number of cattle vaccinated by the Veterinary staff was 56,749 and the results of these vaccinations were highly satisfactory. The disease now involves almost half of the cattle population of the Colony.

Six outbreaks of East Coast Fever occurred in the so-called "clean" areas of the Colony involving upwards of 1000 head of cattle and resulting in 56 deaths. The number of privately owned dipping tanks has increased from 208 to 250, including six tanks constructed of timber. Until recently a Government bonus of Fls 225/- was paid to any farmer who constructed a dipping tank of concrete or masonry according to the Government Plan and specification. Owing to the financial

situation the payment of these bonuses has been discontinued and, for the same reason, it has not been found possible to bring the Cattle cleansing Ordinance into force. It was found admissible to raise the quarantine imposed on three areas for East Coast Fever as the result of systematic dipping and "hand dressing." Three extensive outbreaks of foot and mouth disease came under notice, but deaths only occurred amongst pigs. An outbreak of Tuberculosis in a herd of 220 cattle occurred in the Koru District. This is the first outbreak of this disease which has occurred on a European owned Farm.

There is nothing of note to refer to in connection with other diseases, particulars of which will be found in the report of the Chief Veterinary Officer, attached hereto. The importations of purebred stock for breeding purposes were as follows :—10 Horses from the United Kingdom, 3 Horses, 10 cattle and 25 sheep from the Union of South Africa. Thirteen thousand four hundred and eightyone head of trade cattle passed through the various Veterinary Quarantine stations as compared with 22,738 during the previous twelve months. This decrease is largely attributable to general trade depression.

The Quarantine Station at Nairobi was removed from its former site near the Railway Station to an area of Government land about two miles from the Station on the Thika tramway. A loading ramp has been erected on the tramway so that livestock proceeding to the quarantine station can be off-loaded from the truck direct into the station. Two heifers imported from England and vaccinated against Redwater and Anaplasmosis at Onderstepoort Laboratory are now housed in this Quarantine station and blood drawn from them will be used to immunise imported cattle.

The Abbatoir returns from Mombasa and Nairobi for the past two years are as follows :—

	Nairobi—Mombasa. 1919-20.		Nairobi—Mombasa. 1920-21.		Nairobi—Mombasa. 9 months ending 31st December, 1921.	
Cattle	7,025	3,232	8,337	3,512	5,979	2,342
Sheep & Goats	23,422	8,325	22,001	8,575	15,158	6,072
Pigs	493	—	582	—	876	—
Game	—	—	—	—	452	—
Camels	—	6	—	4	—	—

At Nairobi 71 cattle, 203 sheep and goats, 7 pigs and 7 game were condemned as unfit for human consumption.

RESEARCH DIVISION :

A vacancy for an Assistant Veterinary Pathologist in this Division remained unfilled during the period under review. Experiments and investigations were undertaken on :—

1. Disease of Swine.
2. Serum diagnosis of bovine pleuro-pneumonia.
3. Immunity conferred by inoculation—pleuro-pneumonia—field experiment.
4. Effect of injection of trypanblau in Redwater (Cattle) and tick fever (Dogs).
5. The tuberculin test in cattle.
6. Anaplasmosis.
7. Redwater—Gall Sickness vaccine.
8. Colon bacillosis.
9. Infectious bovine abortion.
10. Abortion in mares.
11. Trypanosomiasis—treatment with drugs.
12. Kikuyu Fowl disease—preparation of anti-serum.
13. Rinderpest immunisation.
14. Ulcerative Lymphangitis—vaccine treatment.
15. Epizootic Lymphangitis—drug treatment.
16. Pseudo rabies in dogs and jackals.
17. "Wasting Sickness" of cattle.

The results of these experiments and investigations are detailed in the attached report of the Chief Veterinary Research Officer.

The quantities of sera and vaccines issued during the past nine months were as follows :—

Anti-Rinderpest Serum	5,876,190 c.cs.
Pleuro-pneumonia vaccine	176,091 doses.
Black quarter vaccine 1st	17,870 ,,
Black quarter vaccine 2nd	17,820 ,,
Anthrax Vaccine 1st	12,855 ,,
Anthrax Vaccine 2nd	13,030 ,,
Anthrax Vaccine single	350 ,,
Colon Bacillosis vaccine	6,122 ,,
Kikuyu Fowl Disease vaccine	9,690 ,,
Ulcerative Lymphangitis vaccine	1,575 ,,
Blue Tongue vaccine	20 ,,
Trypanblau (Canine)	714 ,,
Trypanblau (Bovine)	187 ,,

A total of 2,257 slides and specimens received from Government Officials and Stockowners were examined and reported on during the year.

The work of the Laboratory staff in connection with the production of sera and vaccines occupies such a large proportion of the time of the Officers that the amount of research work carried out reflects great credit on all concerned.

The experimental cattle which cannot be maintained at the Laboratory owing to lack of grazing are still on Government land near Londiani; but after the rains break these cattle will be moved to the area set aside for them near Nairobi, where arrangements for their receiption are nearing completion.

PUBLICATIONS.

The following Bulletins, Articles, etc., prepared by Officers of the Department have been published during the period under review :—

Annual Report of the Department of Agriculture 1919-20.

Fungoid Diseases of Coffee in Kenya Colony; by J. McDonald, D.F.C., B.Sc., Mycologist Bulletin No. 7.

Report on visit to Guatemala and Costa Rica to investigate methods of cultivation of Coffee and its Diseases and pests :—by A. D. le Poer Trench, Senior Coffee Officer, Bulletin No. 8.

Growing and Harvesting of Flax in Kenya :—by W. G. Scott, Senior Flax Officer and G. M. Hamilton, Flax Officer. Bulletin No. 9.

Preparation of Coffee :—by A. D. le Poer Trench, Senior Coffee Officer. Bulletin No. 10.

Flax Retting and Scutching :—by W. G. Scott, Senior Flax Officer and G. M. Hamilton, Flax Officer, Bulletin No. 11.

Methods of Maize Breeding :—by G.L.J. Burton, B.A., Plant Breeder. Bulletin No. 12.

Notes on Rice Culture) by the Manager
Notes on Arrowroot Culture) Government Farm,
Notes of Ginger Culture) Mazeras.

Few Cultural notes on Cotton.

Agricultural Census 1920. First Report.

Meteorological Records 1914-19. 11th Report, Meteorological Bulletin No. 4.

Meteorological Records 1914-19. Extract from 11th Report, Meteorological Bulletin No. 5.

Meteorological Records 1920. 12th Report. Meteorological Bulletin No. 6.

Experiments and observations in connection with (1) Rinderpest immunisation (2) Pleuro-pneumonia, contagious bovum (Lung Sickness) and the preventive method of inoculation :—by J. Walker, M.R.C.V S., Veterinary Pathologist.

Pleuro-pneumonia contagious bovum—the preparation of pleuro-pneumonia (pure culture) vaccine in bulk :—by J. Walker, M.R.C.V.S., Veterinary Pathologist.

Inoculation of cattle against Redwater and Anaplasmosis (Genuine Gall Sickness) by J. Walker, M.R.C.V.S., Veterinary Pathologist.

Pleuro-pneumonia (lung sickness in cattle) and the preventive method of inoculation by J. Walker, M.R.C.V.S., Veterinary Pathologist.

Contagious (epizootic) abortion, by J. Walker, M.R.C.V.S., Veterinary Pathologist.

Submitted with this report are following appendices :—

Appendix (a) Staff as at the 31st December, 1921.

Appendix (b) Annual Report of the Chief Veterinary Officer.

Appendix (c) Annual Report of the Chief Veterinary Research Officer.

Appendix (d) Annual Report of the Chief, Division of Entomology.

Appendix (e) Annual Report of the Mycologist.

Appendix (f) Annual Report of the Plant Import Inspector.

Appendix (g) Annual Report of the Manager, Government Stock Farm, Naivasha.

Appendix (h) Annual Report of the Manager, Government Farm, Kabete.

Appendix (i) Annual Report of the Plant Breeder.

Appendix (j) Annual Report of the Senior Flax Officer.

Appendix (k) Annual Report of the Senior Coffee Officer.

Appendix (l) Annual Report of the Acting Manager, Government Farm, Mazeras.

Appendix (m) Annual Report of the Officer in charge, Government Farm, Kibos.

Thanks are due to the Staff for their efficient work during the period under review.

E. HARRISON,

March, 1922.

Acting Director of Agriculture

Appendix B.

VETERINARY DEPARTMENT.

REPORT

OF

THE CHIEF VETERINARY OFFICER

FOR

THE PERIOD OF NINE MONTHS ENDED
31ST DECEMBER, 1921.

STAFF CHANGES:

Mr. W. Kennedy, D.S.O., Deputy Chief Veterinary Officer, was appointed Chief Veterinary Officer with effect from April 1st, 1921.

Lieut. Colonel. A. G. Doherty, M. C., Senior Veterinary Officer, was appointed Deputy Chief Veterinary Officer with effect from April 1st, 1921.

Mr. A. S. Mathias, Veterinary Officer, left the service of the Colony on September 10th, when he was granted a transfer to the Nyasaland service.

Mr. E. J. Mulligan, was appointed to the staff of Veterinary Officers on December 18th, and the staff still remains short of the provision by two units.

Mr. C. J. Robbins, Clerk, left the Department on December 31st, on transfer to the Land Department.

DISEASES OF CATTLE.

RINDERPEST:

The number of outbreaks of rinderpest which occurred outside native reserves during the nine months

under review was twenty nine. This figure compares favourably with the numbers of outbreaks shown in the reports for the twelve months ending March 31st, 1921, and March 31st, 1920, which were fifty four and eighty respectively. The details of the outbreaks are as follows :—

District.	Number of outbreaks.	Number of cattle involved	Number of Deaths.
1. Naivasha-Nakuru.	3	4,682	33
2. Uasin Gishu-Trans Nzoia.	16	4,753	45
3. Nyeri-Rumuruti.	1	88	4
4. Lumbwa.	6	4,540	145
5. Nairobi.	3	1,309	76
Total	29	15,372	303

Rinderpest was prevalent in most of the native reserves during the period under review, and frequently spread to the European areas. This fact accounts for the comparatively large number of outbreaks which occurred in the Uasin Gishu, Trans Nzoia, and Lumwa Districts as these Districts border on native reserves in which rinderpest is enzootic.

In one of the twenty-nine outbreaks infection was believed to have been introduced to the farm by diseased Wart Hogs, and in another, bush buck were considered to be the carriers. The reminder of the outbreaks were attributed to illicit movement of infected meat or cattle from native reserves.

In dealing with these outbreaks double inoculations were carried out wherever it was possible to do so and, where this was not possible, the "serum alone" method was adopted. In this way 8,865 head of

cattle were double inoculated against rinderpest and 6,507 were treated by the injection of anti-rinderpest serum.

In most cases the results of both methods of treatment were very satisfactory but in a few cases the losses suffered were rather heavy. The losses were mainly due to the cattle having become heavily infected before inoculations were carried out and in some cases deaths from all causes were included as having occurred from rinderpest.

Double inoculations were commenced in the Uasin Gishu district during December and at the end of the month 4,366 head had been dealt with. The results of these inoculations are not yet to hand.

In the quarantine stations which are situated on the confines of the native reserves to deal with cattle leaving the reserves, 13,974 cattle were double inoculated against this disease bringing the total number of cattle double inoculated during the period under review up to 27,205.

On December 31st. five European farms as well as Nairobi Township remained in quarantine for rinderpest and the following native reserves were also quarantined on account of this disease :—1. The Masai Reserve; 2. The Native Reserves of the Nyanza Province; 3. The Akamba Reserves; 4. The Kikuyu Reserve, and 5. The Northern Frontier District and Jubaland.

PLEURO-PNEUMONIA.

The following outbreaks of contagious bovine pleuro-pneumonia occurred on European-owned farms during the period under review :—

Lumbwa District	14	outbreaks
Uasin Gishu—Trans Nzoia Districts	18	,,
Nakuru District	2	,,
Total	34	outbreaks.

In dealing with these outbreaks over 38,000 head of cattle were vaccinated against the disease with "culture" vaccine prepared at the Laboratory. The number of deaths which occurred from natural infection was 350 and deaths resulting from vaccination did not exceed one per thousand. Sixtyfive infected cattle were slaughtered at Eldoret with the owners' consent.

Pleuro-pneumonia continued to spread in the native reserves of the Nyanza Province and the quarantine stations situated on the borders of these reserves remained closed in consequence. In spite of all precautions the disease spread on several occasions from the native areas to European farms largely through the illicit movement of squatters cattle.

Owing to the large areas occupied by natives now quarantined for this disease and the consequent interference with trade, representations were made to Government by officers of the Administration to have the quarantine restrictions relaxed as it was believed that these were seriously interfering with the collection of taxes. A Special Committee of the Legislative Council was therefore appointed in October "to examine and report upon the position in respect of bovine pleuro-pneumonia and to make recommendations regarding the steps which should be taken to deal with it". The report of this Committee has not yet been published.

The vaccination of the cattle in the Kyambu District of the Kikuyu Reserve which was commenced last year was completed in June—15,200 head being successfully dealt with.

The number of cattle inoculated by the Veterinary Staff during the period under review was as follows :—

(1) On European owned farms	...	29,789 head
(2) In Native Areas ...	...	15,200 ,,
(3) In Quarantine Stations	...	11,760 ,,
Total	...	56,749 head.

On December 31st. twenty-one European farms remained in quarantine for pleuro-pneumonia as well as the following native reserves :—
1. Masai Reserve, 2. The Native Reserves of the Nyanza Province, 3. The Suk and Turkana districts, 4. The Uasin Gishu Masai and Kamasia Reserves.

EAST COAST FEVER.

Six fresh outbreaks of East Coast Fever occurred in the so-called "clean" areas during the period under review. Two of these outbreaks occurred in the Nakuru area, two in the Molo area, one in the Limoru area, and one in the Nyeri area.

Upwards of a thousand head of cattle were involved in these outbreaks and fifty-six deaths occurred. In combating these outbreaks dipping and "hand-dressing" was resorted to in three cases and spraying in one case but the results obtained from spraying were not considered satisfactory.

The last death reported from this disease in the Naivasha infected area occurred on July 29th.

The number of privately owned dipping tanks in the Colony is now 250 as against 208 last year. This number includes six tanks constructed of timber. In the past the Government paid a bonus of Rs. 225/- on each privately owned tank constructed of concrete and masonry and passed as built according to the Government plan and specification by an Engineer of the Public Works Department. These bonuses were intended to take the place of a rebate on the cement used but owing to the financial situation the Government did not consider it advisable to continue making these payments and notice to this effect was given in July.

Four more dipping tanks were erected by the Government during the period under review bringing the total number of Government owned tanks up to forty two, and the number of cattle passed through these tanks was 123,253.

With regard to the analysis of dip samples the Director of Chemical Research has been good enough to supply the following comparative statement.

Class.	Error in strength.	1917.	1918.	1919.	1920.	1921.
Sufficiently correct.	Not exceeding 10%	52.9	50.1	48.2	46.2	46.5
Seriously wrong.	11% to 20%	26.1	24.2	25.9	23.7	25.7
Dangerously wrong	Exceeding 20%	21.0	25.7	25.9	30.1	27.8
Total No. of samples Analysed.		1223	673	873	911	706

Owing to lack of funds it has not yet been found possible to bring the Cattle Cleansing Ordinance into force.

Six hundred and thirty three head of cattle were tested for immunity to East Coast Fever and 625 survived the test.

As the result of systematic dipping and "hand-dressing" it was found possible to raise the quarantine on three infected areas during the past nine months.

FOOT AND MOUTH DISEASE:

An outbreak of foot and mouth disease came under notice on a farm in the Nairobi district in August; later, the disease was discovered on one or two neighbouring farms. No deaths occurred from the disease and quarantine was raised in November. The origin of infection was not traceable.

In the Gilgil District an extensive outbreak came under notice in September and October, involving nine farms and 2,073 head of cattle. There was no mortality and quarantine was raised in November. The source of this outbreak could not be traced; but

infection may have been introduced by trade cattle from the Northern Frontier District.

In November and December outbreaks occurred at the Isiolo Quarantine Station, at Nanyuki, and on ten farms near Rumuruti.

In the Rumuruti outbreak 3,850 cattle (grades and natives), 1,550 sheep (grades and natives) and 39 pigs were involved. Only two deaths (sucking calves) occurred amongst the cattle but loss of condition was marked. As soon as recovery took place, however, the cattle rapidly regained their condition in spite of the fact that grazing was scarce owing to drought. No cases occurred among the sheep although in one case 150 native sheep were bomaed (kraaled) with infected cattle. The disease spread to the pigs through feeding them on infected cows' milk and thirty five died out of thirty nine.

This extensive outbreak was traceable to infection introduced by cattle from the Northern Frontier District where the disease appears to be enzootic.

TRYPANOSOMIASIS :

Outbreaks of trypanosomiasis occurred on farms in the Ravine, Solai, Laikipia and Ithanga districts and isolated cases came under notice at Mombasa and at the Isiolo Quarantine Station. The origin of the outbreak at Ravine was not ascertained but the outbreaks in the Solai District were apparently traceable to infection having been introduced to the farm by donkeys which had been working in a tsetse fly belt. Entomological surveys were carried out in connection with the Solai, Ithanga, and Laikipia outbreaks by an Officer of the Entomological Division. No tsetse flies were found on the farms involved but in the case of the Laikipia outbreak it appeared likely that occasionally tsetse flies are brought from Kamasia on to the farm by wild buffaloes.

ANTHRAX :

The following outbreaks of Anthrax came under notice during the period under review :—

Nyeri District	...	5 outbreaks.
Nakuru District	...	3 ,,
Nairobi District	...	6 ,,
Lumbwa District	...	1 outbreak.
	Total	15 outbreaks.

All these outbreaks were dealt with by quarantine and inoculation and the results were very satisfactory.

Many cases of anthrax present similar symptoms to these of snakebite and in consequence deaths from anthrax are frequently overlooked by the owner. This disease must therefore be considered to be much more widespread in the Colony than the Veterinary returns would lead one to believe.

The number of cases confirmed by the Laboratory as anthrax during the past nine months was twenty-two.

TUBERCULOSIS :

An outbreak of tuberculosis came under notice on a farm in the Koru district in June involving a herd of 220 cattle. The ordinary tuberculin (subcutaneous) test was carried out but it was found to be very difficult to decide what were reactions and what were not, owing to the considerable variations of temperature recorded in untested cattle. These variations of temperature were carefully studied earlier in the year when the tuberculin test was applied to a number of imported bulls at the Government Farm, Naivasha, and it would appear that the subcutaneous test cannot be considered reliable unless the cattle can be housed in airy sheds with sunproof roofs for a fortnight before the test in applied and their temperatures can be taken regularly during that period.

As a result of the first test of the above mentioned 220 head of cattle eight head have been slaughtered and four of these proved to be infected.

Arrangements have now been made to retest the herd by the intra-palpabral method. Infection is thought to have been introduced to this farm by cattle imported from Uganda some years ago.

BLACKQUARTER.

Thirteen outbreaks of blackquarter came under notice during the past nine months.

These outbreaks were dealt with by vaccination with satisfactory results.

REDWATER AND ANAPLASMOSIS.

Arrangements were made last year to have four heifers, imported from England, vaccinated against Redwater and Anaplasmosis at Onderstepoort Laboratory and forwarded to this Colony. It was later decided to sell two of these heifers in South Africa and the remaining two arrived in Nairobi in August. They are now housed in the new Quarantine Station, Nairobi, on the Thika Railway and every precaution is taken to keep them tick-free in order to avoid having them infected with the local strain or strains of Anaplasmosis. Blood drawn from these heifers will be used to immunize imported cattle and this should considerably reduce the mortality among such stock.

DISEASES OF EQUINES.

ULCERATIVE LYMPHANGITIS.

Seventy six cases of ulcerative lymphangitis; came under notice during the period under review as compared with seventy seven for the twelve months ending March 31st. 1921, and one hundred and thirty six for the twelve months ending March 31st. 1920.

Forty two of the seventy six cases were reported from the Uasin Gishu—Trans Nzoia district.

EPIZOOTIC LYMPHANGITIS.

Nineteen cases of epizootic lymphangitis were reported during the period under review as against upwards of fifty cases in the previous twelve months.

ANTHRAX.

Only one horse was reported as having died of Anthrax. The diagnosis was confirmed at the Laboratory.

MANGE.

One case of sarcoptic mange was reported from Kericho.

TRYPANOSOMIASIS.

Three horses, eight mules, and six donkeys were reported to have died of trypanosomiasis during the past nine months.

DISEASES OF SHEEP AND GOATS.

Arrangements were completed during the period under review to manufacture the Onderstepoort "wire worm" remedy which is used with success in South Africa and Stock owners can now obtain supplies, with instructions for use, from the Veterinary Laboratory.

A Veterinary Officer who toured in the native reserves of the Nyanza Province for some months reported that sarcoptic mange was responsible for a heavy mortality amongst the goats and that foot rot was prevalent throughout the reserves.

A few outbreaks of sheep scab and blue—tongue came under notice during the period under review.

One outbreak of Anthrax in sheep came under notice in the Rumuruti district resulting in two deaths.

DISEASES OF PIGS.

Five outbreaks of anthrax came under notice in pigs during the past nine months. In each case the mortality was arrested by the use of vaccine.

An outbreak of swine fever occurred in Nairobi towards the end of December. 40 pigs were involved and up to date 17 have died.

One outbreak of Foot and Mouth Disease in the Rumuruti district resulted in the deaths of thirtyfive pigs out of thirty nine involved. Infection was traceable to feeding on infected cows' milk.

DISEASES OF DOGS.

No cases of rabies were reported during the period under review. A very virulent form of distemper made its appearance in Nairobi in August and rapidly spread throughout the whole Colony. The disease was apparently introduced by a dog imported from England in July and the severity of the outbreak is attributable to the fact that the dogs in the Colony had not suffered from distemper for some years. The mortality was estimated to be about 50%.

LIVESTOCK IMPORTATIONS:

The livestock importations through the ports of Kilindini and Mombasa for the past two years and nine months were as follows:—

	1919—20.	1920—21.	Nine months ended 31st December, 1921.
Horses	84	41	22
Cattle	840	1,342	620
Sheep and Goats	2,445	5,652	1,458
Pigs	39	93	2
Camels	24	29	8
Mules	5	20	1
Donkeys	183	78	4
Dogs	60	152	70
Cats	8	5	1
Lemurs	—	—	3
Mongoose	—	—	1
Poultry	339	582	278

ANALYSIS OF IMPORTATIONS:

	United Kingdom.	South Africa.	India.	Tanganyika Territory.	Zanzibar.	Jubaland and Italian Somaliland.	France.	Egypt.	Holland.	Australia.
Horses	10	3	2	—	1	1	—	5	—	—
Mules	—	—	—	—	—	1	—	—	—	—
Donkeys	—	—	—	—	—	4	—	—	—	—
Cattle	—	10	—	—	—	610	—	—	—	—
Camels	—	—	—	—	—	8	—	—	—	—
Sheep	—	25	—	—	—	112	—	—	—	—
Goats	—	—	—	—	—	1,321	—	—	—	—
Pigs	2	—	—	—	—	—	—	—	—	—
Poultry	124	122	7	16	9	—	—	—	—	—
Dogs	40	13	6	2	2	2	1	—	3	1
Cats	—	1	—	—	—	—	—	—	—	—

TRADE STOCK:

The following statement shows the number of trade stock dealt with at the various quarantine stations during the past nine months :—

	Cattle.	*Sheep.*	*Ponies and Mules.*
Kibigori ...	2,227	—	—
Isiolo ...	5,023	18,009	1,369
Kamakoiwa ...	2,218	—	—
Machakos ...	1,125	—	—
Waterfalls ...	2,818	—	—
Kamarin ...	70	—	—
Total	13,481	18,009	1,369

The total number of cattle dealt with at the various quarantine stations last year was 22,738 and the decrease shown over the period of nine months of this year is largely atributable to general trade depression. The revenue from quarantine stations amounted to £4,809-16.54 Shillings.

The following inoculations, costs etc., were carried out in dealing with the above mentioned stock :—

Rinderpest (double) inoculations	14,044
Pleuro-pneumonia inoculations	11,760
Blackquarter inoculations	186
Anthrax inoculations	922
Mallein test	1,369
Dippings (Sheep and Goats)	18,009
Dippings (Cattle)	15,000

QUARANTINE STATIONS FOR IMPORTED STOCK :

The Quarantine Station at Kilindini had to be removed on account of the projected pier extension.

The Quarantine Station at Nairobi was removed from its former site near the Railway Station to an area bounding on the Thika Railway about two miles from the Railway Station. The area on which this station is situated is about 1,500 acres and arrangements have been made to erect a cattle dipping tank on it, to conserve water and generally to provide for the accommodation of surplus cattle from the Veterinary Laboratory.

MEAT INSPECTION :

The following abattoir returns have been received from Nairobi and Mombasa and the returns for the previous two years are given for purposes of comparison :—

	1919-20.	1920-21.	Nine months ended 31st December, 1921.
1. NAIROBI.			
Cattle slaughtered	7,025	8,337	5,979
Sheep and Goats slaughtered	23,422	22,061	16,158
Pigs slaughtered	493	582	876
Game inspected	—	—	452

The numbers of carcases condemned as unfit for human consumption were 7¼ cattle, 203 sheep and goats, 7⅓ pigs, and 7 game.

These carcases were condemned for the following reasons :—

CATTLE :

Emaciation	7
Rinderpest	1
East Coast Fever	29
Pleuro-pneumonia	10¼
Measles	24

SHEEP AND GOATS :

Pleuro-pneumonia	64
Measles	1
Jaundice	9
Pleurisy	1
Emaciation	128

PIGS :

Swine Fever	5
Measles	1
Pleurisy	1⅓

GAME :

Measles	7

2. MOMBASA :

	1919—20.	1920—21.	Nine months December, 1921. ended 31st
Cattle slaughtered	3,232	3,512	2,342
Sheep and Goats slaughtered	8,325	8,575	6,070
Camels slaughtered	6	4	—

The Veterinary Officer, Nairobi, was appointed Municipal Veterinary Officer during the period under review and now supervises the slaughter houses, cowsheds etc., in the township in addition to his other duties.

PERMIT SYSTEM :

The permit system continues to be of great assistance in checking indiscriminate and illicit movements of stock and the spread of disease thereby. There are now 105 Honorary Permit Issuers distributed as follows :—Naivasha Province 63, Kenya Province 25, Nyanza Province 13, and Ukamba Province 4.

BRANDING OF STOCK ORDINANCE :

The following are the particulars of brands registered, transferred and cancelled during the period under review :—

Brands registered ...	63
Brands transferred	Nil
Brands cancelled	1

The following branding irons were issued :—

To Government Departments	41
To Uganda Protectorate	6
To Tanganyika Territory ...	36
To private individuals	74

The cost of advertising in two of the local papers for tenders for the manufacture of branding irons for 1922, amounted to £13.4 Shillings.

RESIDENT NATIVES ORDINANCE:

Eight "S" brands were made and issued to farmers during the period under review for the branding of native owned cattle grazing on European farms.

CORRESPONDENCE:

4,124 inward and 4,235 outward communications and memoranda were dealt with during the nine months under review. The latter figure does not include letters or memoranda of which more than one copy was required for circulation purposes.

(*Sd.*) W. KENNEDY,
Chief Veterinary Officer.

APPENDIX "C".

REPORT

OF THE

VETERINARY PATHOLOGIST.

DIVISION OF VETERINARY RESEARCH.

KABETE.

FOR THE PERIOD,
APRIL 1st, 1921 to DECEMBER 31st, 1921.

To:—
The Hon'ble, The Director of Agriculture,
thro'
The Chief Veterinary Officer, Nairobi.

Sir,

I have the honour to submit the following Report upon work of this Division for the above-mentioned period.

STAFF.—

The change of designations of the Professional Officers of this Laboratory were not shewn in the estimates until 1922, consequently the designations remained unaltered until the end of December 1921.

The change of designation of the Laboratory from "Veterinary Pathological" to "Veterinary Research Laboratory" took effect from 1-4-21.

CHANGES.—

Mr. R. Kerr, Mechanic, was invalided out of the service, his duties at the Laboratory terminating on June 1st, 1921.

He was replaced by Mr. O.Stenmark, who assumed the duties of the Post on August 28th, 1921.

DEPARTURES.—

The following Officers proceeded on Leave on the dates shewn:—

The Veterinary Pathologist.—June 2nd, 1921.

Mr. R. Kerr. Mechanic.—August 24th, 1921, termination of appointment.

Mr. A. R. Ballot, Clerk.—November 11th, 1921.

ARRIVALS.—

The following arrived on return from leave during the period under review:—

The Veterinary Pathologist.—August 5th, 1921.

Mr. J. Ford, Laboratory Assistant.—November 8th, 1921.

PROMOTIONS.—

Mr. T. C. Bradshaw and Mr. S. H. Whitworth, were gazetted as Acting Assistant Veterinary Pathologists with effect from April 1st, 1921.

VACANCIES.—

The following Posts remained unfilled throughout the Year:—

One 2nd Assistant Veterinary Pathologist.

Three Laboratory Students.

TRAVELLING.

The following Officers were absent from the Station on duty, for the periods and purposes shewn against their names : —

Mr. W. Kearney, 1st Assistant Veterinary Pathologist.

September 13th.	To Thika and returned same day, to investigate Sickness in Calves.
September 20th. to 22nd.	At Nakuru. Investigations into "Nakuruitis".
October 8th to 10th.	At Machakos. Investigating mortality in cattle.
November 1st to 4th.	At Nakuru. Investigations into cause of Abortion in Mares at Lord

	Delamere's Soysambu Estate.
November 11th to 15th.	At Nyeri. Investigating mortality in calves and observing the effect of Contagious Abortion vaccine in Major Armstrong's cattle, Nanyuki.

Mr. T. C. Bradshaw, 2nd Assistant Veterinary Pathologist.

October 5th to 7th.	At Londiani, Inspecting the cattle and conditions at the Laboratory Stock Farm.

Mr. S. H. Whitworth, 3rd Assistant Veterinary Pathologist.

April 5th to 6th.	At Gilgil. Investigations into sickness amongst Pigs at East African Syndicate.
April 11th to 13th.	At Naivasha. Swine Fever at Mr. Lloyd's Farm.
June 29th to 30th.	At Uplands. Sickness in Pigs.
July 18th to 21st.	At Londiani. Pleuro-pneumonia investigations.
July 26th to 30th.	At Kibigori. Pleuro-pneumonia investigations.
July 31st to August 1st.	At Uplands. East Coast Fever investigations.
August 17th to 20th.	At Kibigori with Laboratory Assistant J. McQueen. Pleuro-pneumonia investigations.
November 2nd. to 23rd.	At Kibigori. Pleuro-pneumonia investigations.

Mr. J. T. Schultz, Laboratory Assistant.

June 4th to 5th.	At Nakuru. To collect material from case of suspected Lymphangitis.

Mr. P. H. Poolman, Laboratory Assistant.

September 3rd to 11th.	At Naivasha, capturing Wild Pigs
September 12th to 30th.	for Swine Fever experiments.

Mr. J. Burton, Farm Overseer.

July 15th to 17th.	At Naivasha, to inspect cattle prior to purchase for control purposes.

CORRESPONDENCE.—

2,875 Inward and 2,509 Outward papers were dealt with during the nine months under review—a Total of 5,384. This does not include confirmation of telegrams or the numerous letters and papers sent to the Laboratory by the Veterinary and other Departments for noting and return.

The subjects dealt with comprise both Technical and Administrative, of which the following may be considered as the most important.—

TECHNICAL.—

- Pleuro-pneumonia.
- Swine Fever.
- Rinderpest, "Double inoculations".
- Anaplasmosis.
- Wireworm remedy.
- Bluetongue vaccine.
- Tuberculosis.
- Wasting Sickness, "Nakuruitis".
- Contagious Abortion.
- Kikuyu Fowl Disease.
- Colon Bacillosis.
- Lymphangitis and treatment of Equines.
- Foot and Mouth disease.
- East Coast Fever.
- Dipping Formulae.
- Diagnosis of disease.
- Trypanblue.

ADMINISTRATIVE.—Housing accommodation.
Water supply.
Laboratory Power Plant.
Facilities for the loading of Stock at Kabete Station.
New Railway deviation & new Roads
Farms, Athi River and Londiani.
Acquisition of Land, Londiani.
Purchase and Control of Stock.
Laboratory Buildings and Land.
Artizan and Native labour.
Sale of Sera and Vaccines.
Transport charges and claims.
Store Indents.
Foodstuffs.
Narok Laboratory.
Postal Agency at Kabete.
Monthly Reports.
Estimates.
Laboratory Grazing.

LABORATORY FARM WORK.—

The area under cultivation for the production of animal foodstuffs approximated 150 acres. Owing to the continued drought, practically all crops failed, and this, together with the scarcity of grazing necessitated increased purchases of foodstuffs from outside sources. Approximately, £2,230, was spent in this manner.

Other work by the farm labour and oxen included the upkeep of roads and the transport of material from Kabete Station and Nairobi.

BUILDINGS AND LAND.—

No buildings were erected by the Public Works Department during the period under review, but the following were built by our own fundies:—

Thirty-two Pig-styes at the Laboratory Farm for the accommodation of pigs awaiting experiments.

One large shed and run at the Laboratory for accommodating pigs on Swine Fever experiments.

The above buildings were constructed of wattle poles and bamboos, with corrugated iron roofs, and although of a temporary nature, they will nevertheless serve their purpose until such times as funds are available for the erection of more permanent buildings.

Two small buildings to accommodate the Plant used for the manufacture of Wireworm remedy were also erected. They were constructed of squared timber and corrugated iron with concrete floors.

General repairs to buildings were also carried out by the Laboratory Fundies wherever possible.

Owing to the shortage of accommodation, the housing of the Staff has been a very difficult problem throughout the whole year, and will, I am afraid, prove increasingly difficult in the future. It is hoped that provision for extra housing will be made at the earliest possible moment. In order to partly relieve the situation, a small wood and iron hut was erected by Reformatory labour in July, for the accommodation of the 1st Assistant Veterinary Pathologist.

LAND.—

Owing to the failure of both the long and short rains, our grazing during the year has been practically nil, necessitating an increased ration being issued to all animals.

The shortage of water has also proved exceedingly serious. It is with extreme difficulty that we have obtained sufficient to keep the Laboratory and Plant running, and the majority of our stock have been watered daily at the stream situated some two miles from the Laboratory.

The Municipality were approached with a view to the supply from the Railway pipe line being augmented but they were unfortunately unable to help us.

LABORATORY PLANT AND EQUIPMENT.—

STEAM SUPPLY.—

In September 1921, the Laboratory Boiler, which was erected in 1914, and which has been in continuous use ever since, was tested by Railway experts and found to be unfit for further use. A large and more suitable Boiler was ordered from England and arrived at the end of the Year.

The Public Works Department kindly loaned us a small Pulsometer Boiler to enable us to keep the steam Plant in commission during the interval.

ELECTRICAL PLANT.—

This was out of commission for several months of the Year owing to the fact that the boiler, loaned to us by the Public Works Department, was not sufficiently powerful to supply steam both for use in the Laboratory and for driving the dynamo.

Both the Dynamo and Batteries are now too small for our requirements and should be replaced by a larger type as soon as Finances permit.

CENTRIFUGES.—

The three electrically driven Centrifuges, which had not been in use for some considerable time past, have now been re-erected to give better service and a system of shafting and pulleys installed to enable either Machine to be used with one Motor instead of three separate motors as hitherto.

GAS PLANT.—

This has been in constant use throughout the Year.

GENERAL.—

Owing to Mr. Kerr, our previous Mechanic, being taken ill at the end of May 1921, and being subsequently invalided out of the Service, the Laboratory Plant was without technical supervision until the end of August when another Mechanic was appointed. During that

period the Plant was run by a Native and consequently suffered accordingly. With the appointment of the new Mechanic, the whole Plant had to be overhauled and parts of it replaced, causing a certain amount of dislocation in the work of the Laboratory.

The necessary Machinery for the manufacture of Wireworm Powder has been installed and is working satisfactorily.

The crushing mill was obtained from South Africa and the remainder of the Plant purchased locally.

FINANCE.—

EXPENDITURE.—

The total expenditure sanctioned for this Division for the Nine months ended December 31st, 1921, was £28,158. Of this amount, £11,945 was for Personal Emoluments, including Native Labour, the balance of £16,213, being for the Purchase of Animals, Apparatus, Machinery, etc., General Upkeep of the Laboratory, Transport and Passages.

The total sum expended will probably prove to be somewhere about £23,700, it being estimated that savings to the extent of about £4,400 were made during the Year.

REVENUE.—

When the Estimates for 1921 were submitted, it was anticipated that the Sale of Laboratory Products would realize about £13,000, but actually, the revenue will probably amount to somewhere about £7,600. This deficit is due to the fact that Pleuro-pneumonia vaccine is now issued free, whereas when the estimates were framed the gazetted charge for this vaccine was Fls. -/50 per dose. The value of Pleuro-pneumonia vaccine issued gratis during the nine months is £8,295.

It should be noted that revenue derived from Serum used for inoculations in the Field is not included in the above figures, such revenue being shewn under the sub-head, "Testing, Dipping fees, etc." The value of serum issued to Departmental Officers during the past nine months is £4,092.

Sale of Laboratory Stock.—The amount realized for the sale of surplus stock was £1,266.

LIVESTOCK.

Species.	On Books 31-3-21.	Received during period.	Total for period.	Remaining on Books 31.12.21.
Horses.	16.	8.	24.	7.
Mules.	51.	7.	58.	31.
Donkeys.	6.	—	6.	—
Cattle.	1,222.	425.	1,647.	855.
Sheep.	105.	22.	127.	89.
Goats.	17.	7.	24.	18.
Pigs.	18.	187.	205.	123.

TECHINICAL WORK.

Routine. (a). Examination of Smears & Specimens
(b). Preparation of Sera & Vaccines.

(a). EXAMINATION OF SMEARS AND SPECIMENS.—

A total of 2,257 Slides and Specimens received from Government Officials and Stockowners were examined and reported on during the Year.

The classification of the diagnosis arrived at, is as follows:—

BOVINES. TOTAL EXAMINED.	1,734
Anthrax	22
Blackquarter	19
East Coast Fever	321
Suspicious East Coast Fever	31
Pleuro-pneumonia	56
Redwater	15
Scabies	1
Trypanosomiasis	46
Anaplasmosis	7
Bacillary Necrosis	5

Contagious Abortion	7
Echinococcus Cyst.	1
Fibroma	1
Lymphangitis, (bovine)	1
Small Piroplasms	16
Suspicious Anaplasmosis	1
Spirochaetosis	1
Tuberculosis	3
Distomatosis	1
Fibro-sarcoma	1
Pleurisy	1
East Coast Fever and Redwater	3
Purulent pneumonia	1
Streptothricosis	2
Poisoning	1
Arsenical poisoning	5
Worms	2
Gastro-enteritis	1
Hair ball	1
Blue Tick	1
Apoplexy	1
Purulo Necrotic Pneumonia	2
Suspicious Blackquarter	1
Intussusception of large intestine	1
Interstitial suppurative Pneumonia	5
Broncho pneumonia	1
Negatives	1,143
Awaiting diagnosis	4
Mange	1
Colon Bacillosis	1

EQUINES.	TOTAL EXAMINED. 193
Ulcerative Lymphangitis	53
Epizootic Lymphangitis	2
Mange	1
Streptothrix	5
Suspicious Ulcerative Lymphangitis	9
Suspicious Epizootic Lymphangitis	1
Suspicious Streptothrix	1
Anthrax	1
Trypanosomiasis	3

Arsenical poisoning	1
Awaiting diagnosis	2
Negatives	114

EQUINES. (Mules). TOTAL EXAMINED.	98
Epizootic Lymphangitis	23
Trypanosomiasis	8
Ulcerative Lymphangitis	17
Suspicious Ulcerative Lymphangitis	3
Suspicious Streptothricosis	1
Streptothricosis	1
Streptococci	2
Adenoma	1
Negatives	42

EQUINES, (Donkeys). TOTAL EXAMINED.	16
Suspicious Ulcerative Lymphangitis	4
Trypanosomiasis	6
Negatives	6

OVINES. TOTAL EXAMINED.	20
Anthrax	2
Streptothricosis	2
Awaiting diagnosis	1
Negatives	15

PORCINES. TOTAL EXAMINED.	30
Anthrax	5
Swine Fever	2
Worms, Ascarides	1
Croupons Pneumonia	1
Awaiting diagnosis	1
Negatives	20

CANINES. TOTAL EXAMINED.	40
Gastro-enteritis	2
Mange	2
Tick Fever	11
Streptococci	1
Rupture of Liver	1

Awaiting diagnosis	1
Negatives	22
AVIANS. (Fowls). TOTAL EXAMINED.	101
Kikuyu Fowl Disease	37
Peritonitis	3
Internal haemorrhage	1
Infectious sarcoma of liver	3
Egg Bound	3
Pericarditis	1
Worms	1
Caseous Tumour	1
Diphtheritic roup	2
Intestinal parasites	2
Enteritis	3
Poverty	2
Fibroma	1
Tapeworm infection	2
Chicken pox	1
Negatives	38
AVIANS, (Turkeys). TOTAL EXAMINED.	5
Kikuyu Fowl Disease	4
Negatives	1
AVIANS, (Ducks). TOTAL EXAMINED.	4
Enteritis	2
Internal haemorrhage	1
Negatives	1
DUCK. TOTAL EXAMINED.	1
Negatives	1
TICK. TOTAL EXAMINED	1
Rh. decoloratus	1
FLY. TOTAL EXAMINED.	2
Stomoxys calcitrans	1
Amblyoma variegatum	1

GRASS SPECIMEN. TOTAL EXAMINED.	1
Awaiting identification	1
TOPI. TOTAL EXAMINED.	1
Awaiting diagnosis	1
WILD HARE. TOTAL EXAMINED.	1
Gastro-enteritis	1
GOATS. TOTAL EXAMINED.	7
Negatives	7
RABBITS. TOTAL EXAMINED.	2
Coccidiosis	2

(b) PREPARATION OF SERA & VACCINES.—
The following Table shews the Laboratory Products prepared during the Nine Months:—

	Balance on hand 31st March 1921.	Prepared during the Year	Issued	Balance on hand 31st December 1921.	
Anti Rinderpest Serum	2,586,510	6,003,500 445,380	5,876,190	3,159,200	c.cs.
Blackquarter vaccine. 1st	900	22,310	17,870	5,340	doses
Blackquarter vaccine. 2nd	900	22,310	17,820	5,390	,,
Trypanblue (Canine)	2,025	Nil	290	1,735	c.cs.
	Nil	438	424	14	tubes
Trypanblue (Bovine)	7	185	187	5	tubes
Colon Bacillosis vaccine	19	6,893	6,122	790	doses
Kikuyu Fowl Disease vaccine	Nil	9,690	9,690	Nil	doses
Ulcerative Lymphangitis vaccine	610	2,320	1,575	1,355	c.cs.
Anthrax vaccine. 1st	5,330	14,945	12,855	7,420	doses
Anthrax vaccine. 2nd	5,470	12,670	13,030	5,110	,,
Anthrax vaccine. (Single)	Nil	3,500	350	3,150	,,
Wireworm powder	Nil	8,900	5,800	3,100	,,
Bluetongue vaccine	Nil	8,330	20	8,310	,,
Pleuro-pneumonia vaccine	Nil	176,091	176,091	Nil	,,

Details of the issues are as follows:—

	Local Stockowners	Departmental	Other Countries.	Total Issues.	
Anti Rinderpest Serum	729,380	2,046,250	3,100,560	5,876,190	c.cs.
Blackquarter vaccine. 1st	12,020	5,850	Nil	17,870	doses
Blackquarter vaccine. 2nd	11,870	5,950	Nil	17,820	,,
Trypanblue (Canine)	40	250	Nil	290	c.cs.
	100	324	Nil	424	tubes
Trypanblue (Bovine)	30	157	Nil	187	tubes
Colon Bacillosis vaccine	5,331	791	Nil	6,122	doses
Kikuyu Fowl Disease vaccine	9,690	Nil	Nil	9,690	doses
Ulcerative Lymphangitis vaccine	280	1,295	Nil	1,575	c.cs.
Anthrax vaccine 1st	3,302	9,553	Nil	12,855	doses
Anthrax vaccine 2nd	3,267	9,765	Nil	13,030	doses
Anthrax vaccine Single	Nil	350	Nil	350	,,
Wireworm powder	5,800	Nil	Nil	5,800	,,
Bluetongue vaccine	20	Nil	Nil	20	,,
Pleuro-pneumonia vaccine	42,234	123,657	10,200	176,091	,,

INSTRUCTIONAL.—

During the past Nine months, the Laboratory has been placed at the disposal of the Veterinary Field Officers, Stock Inspectors and others for the purpose of receiving instruction in Laboratory methods of dealing with the various diseases of this Colony.

Several Professional and Lay Officers were stationed, temporarily, at Kabete for this purpose.

LECTURES & DEMONSTRATIONS TO STOCK-OWNERS & OTHERS.—

Lectures were given and Demonstrations carried out, the former at the Government Experimental Farm and the latter at the Laboratory, in connection with the various Stock diseases prevailing in the Colony, by the under-mentioned Professional Officers, viz,

The Veterinary Pathologist .. Mr. J. Walker.
The 1st Assitant Veterinary Pathologist Mr. W. Kearney.
The 2nd Assistant Veterinary Pathologist Mr. T. C. Bradshaw.

In addition to the above, the Veterinary Pathologist lectured at the Agricultural & Horticultural Show held at Nairobi, in December 1921, on "Review of Stock Diseases of Kenya Colony and their treatment with Sera or Vaccines".

LIVE STOCK IMPORTATIONS.—

a. Two of the four Hereford Heifers imported from England and immunised against Redwater and Gallsickness at the Onderstepoort Veterinary Laboratory, South Africa, were shipped per "s.s. Taroba" under the personal supervision of the Veterinary Pathologist and reached Nairobi on the 8th August 1921.

They were brought to this Colony to be utilised as vaccine producers in connection with the immunisation of cattle against Redwater and Gallsickness.

b. A number of White Leghorn and Rhode Island Fowls were also shipped per "s.s. Taroba" under the personal supervision of the Veterinary Pathologist

and reached here on the 8th August 1921.

They were brought to this Colony to be utilised in connection with Kikuyu Fowl Disease investigations.

With the exception of the period—April to August—during which the Veterinary Pathologist was on leave in South Africa, the Professional Staff consisted of the following :—

The Veterinary Pathologist .. Mr. J. Walker.
The 1st Assistant Veterinary Pathologist
Mr. W. Kearney.
The 2nd Asistant Veterinary Pathologist
Mr. T. C. Bradshaw.
The 3rd Assistant Veterinary Pathologist
Mr. S. H. Whitworth.

The following duties were carried out by these Officers :—

The Veterinary Pathologist.—

The preparation of Anthrax vaccine.
The preparation of Bluetongue vaccine.
The preparation of Wireworm remedy.

The Veterinary Pathologist during his visit to South Africa obtained the necessary apparatus, material, etc., in connection with the preparation of the Wireworm remedy at this Laboratory which is similar to that prepared and used extensively in South Africa.

The following was also dealt with by him, viz.,
Technical correspondence.
Publications of a technical nature, i.e.,

Bulletin No. 1. Pleuro-pneumonia (Lung-sickness in cattle) and the preventive method of inoculation.

Bulletin No. 2. Experiments and Observations in connection with,
(1) Rinderpest immunisation.
(2) Pleuro-pneumonia contagiosa bovum (Lungsickness) and the preventive method of inoculation.

Bulletin No. 3. Pleuro-pneumonia contagiosa bovum—the preparation of Pleuro-pneumonia (Pure culture) vaccine, in bulk.

Directions for the use of the following :—
Redwater and Gallsickness vaccine.
Bluetongue vaccine.
Amended directions for the use of Pleuro-pneumonia (Pure culture) vaccine.
Wireworm remedy.
Also Research Work.

The 1st Assistant Veterinary Pathologist.—
The preparation of Blackquarter vaccine.
The preparation of Ulcerative Lymphangitis vaccine.
The preparation of Anti-Coli vaccine.
The preparation of Anti-Kikuyu Fowl disease vaccine.
The diagnosis of Smears and Specimens received from Veterinary Field Officers, Stockowners and others.
Also Research Work.

The 2nd Assistant Veterinary Pathologist.—
The preparation and issue of Anti-Rinderpest Serum including potency tests.
The preparation and issue of Anti-Rinderpest blood.
The preparation and issue of doses of Trypanblue.
The preparation and issue of Pleuro-pneumonia (Pure culture) vaccine, including Virulency tests.
Also Research Work.

The 3rd Assistant Veterinary Pathologist.—
Laboratory experiments in connection with the Serum diagnosis of Pleuro-pneumonia in cattle.

THE PREPARATION AND TESTING OF THE VARIOUS SERA AND VACCINES.

ANTI-RINDEDPEST SERUM.—

The output for the Nine Months amounted to 120,070 units of 50 c.cs.

RINDERPEST.—

No. 1. VIRUS MAKERS. —

No difficulty has been experienced in obtaining locally, the required number of Virus Makers.

No. 2. SERUM MAKERS.—

Approximately 120 head are utilised as serum makers.

Any deficiency through death or other causes was made up with local bred grade cattle.

No. 3. SERUM TESTERS.—

Susceptible Grade cattle, born and reared in the Colony were utilised for Serum testing purposes and no difficulty was experienced in obtaining the required number.

Owing to the failure of the crops and the shortage of grazing at the Laboratory Farm, due to the prolonged drought, considerable quantities of Foodstuffs had to be purchased, during the period under review, to maintain the cattle required for serum making purposes in a suitable condition.

PLEURO-PNEUMONIA (PURE CULTURE) VACCINE.—

Supplies of Pure Culture vaccine sufficient to meet all demands were prepared from Cultures of a strain of virus obtained in April 1919.

The number of doses issued amounted to 176,091.

POTENCY TESTS.— PLEURO-PNEUMONIA (PURE CULTURE) VACCINE.

The Virulency of a strain was determined from time to time.

The results were satisfactory.

(a) Inoculations in the Tail produced reactions in, approximately, 50% of the animals inoculated.

(b) Inoculations "behind the shoulder" without previous Tail inoculation produced 90% reactions and some mortality.

ANTHRAX VACCINE.—

Supplies of Anthrax vaccine, prepared at Kabete after the Pasteur method—were issued.

The number of doses issued amounted to 12,855 1st of double and 13,030 2nd of double.

BLUETONGUE VACCINE.—

Supplies of Bluetongue vaccine were prepared and issued.

The immunisation of Sheep against Bluetongue was not resorted to, to any extent.

REDWATER AND GALLSICKNESS.—

As previously mentioned, two Hereford Heifers were imported to this Colony for the purpose of producing a Redwater and Gallsickness vaccine which is now available for issue.

WIREWORM REMEDY.—

A wireworm remedy in powder form for use particularly in Sheep affected with Wireworm (Haemonchus contortus), was prepared at the Laboratory and issued.

BLACKQUARTER VACCINE.—

The powder form of the vaccine is prepared for issue.

The results of the use of this vaccine in the practice have been satisfactory.

Besides the foregoing, B. coli and Kikuyu Fowl disease vaccines were prepared and issued, as well as Ulcerative Lymphangitis and Contagious abortion vaccines for experimental use.

The hearty co-operation of all Members of the Laboratory Staff in the execution of their duties, during the period under review, again affords me much pleasure of placing on record my appreciation.

TECHNICAL WORK. EXPERIMENTAL.

1. SWINE DISEASES INVESTIGATIONS INCLUDED THE FOLLOWING :—

(1) Preparation of Anti Swine Fever Serum.
(2) Experiments with Wart Hogs.
  (A) To determine the susceptibility of Wart Hogs to Swine Fever.
  (B) Hyperimmunising Wart Hogs.
  (C) Testing the potency of sera prepared from hyperimmunised Wart Hogs.
  (D) The transmission of Rinderpest to bovines by Wart Hogs and vice versa.

1. *The preparation of Anti Swine Fever Serum.*—

Previous experiments carried out at this Laboratory (vide Annual Report of the Veterinary Pathologist for the Year ended March 31st 1912) shew that the British and Hungarian Anti Swine Fever Serum did not protect against the East African Swine Fever virus, and it was decided to obtain a supply of Anti Swine Fever serum from another source, viz., the United States of America, in order to ascertain whether it would protect against the East African Swine Fever virus, the object being to immunise a number of domestic pigs with a view to the production of an Anti Swine Fever serum.

A number of breeding Sows were obtained to ensure a supply of pigs for use as Virus makers, Serum makers and Serum testers.

Unfortunately, some delay has occurred in the despatch of the Anti Swine Fever serum, but it is hoped that this will be available in the near future.

2. *Experiments with Wart Hogs.*—

(A) *To determine the susceptibility of Wart Hogs to Swine Fever.*—

As a result of previous experiments, it was found that the Wart Hog was susceptible to Swine Fever, the conclusion being based on the fact that the blood of Wart Hogs, which had been inoculated with Swine Fever blood, was virulent when inoculated to a susceptible domestic pig.

Experiments to determine the susceptibility of Wart Hogs to Swine Fever were repeated ; these included the following :—

(a) To determine the effect of inoculation of domestic pigs with blood collected from Wart Hogs which had been inoculated some days previously with Swine Fever blood.

Blood was collected from six Wart Hogs on various dates (6—16 days) after they had been inoculated with Swine Fever blood and inoculated to domestic pigs.

RESULT.—

All reacted to Swine Fever.

Two of the six died of Swine Fever, three were bled to death for virus for hyperimmunising purposes.

The remaining animal survived and when tested on its immunity with Virulent blood did not react to Swine Fever.

(b) *In-contact experiments.*—

To determine whether (1) susceptible domestic pigs and (2) susceptible Wart Hogs contract Swine Fever by contact with inoculated Wart Hogs.

(1) *Domestic pigs.*—

Four susceptible domestic pigs were put in contact with Wart Hogs.

The latter were inoculated some days previous with Swine Fever blood and during the time they were in contact, blood was collected from the Wart Hogs and inoculated to susceptible domestic pigs. The blood was virulent.

RESULT.—

None of the four domestic pigs contracted Swine Fever.

When tested subsequently on their immunity they reacted to Swine Fever.

(2) Two Wart Hogs were put in contact with Wart Hogs which had been inoculated some days previously with Swine Fever blood.

RESULT.—

Both Wart Hogs remained apparently healthy. No blood was collected to determine whether they were harbouring the virus.

(B). *Hyperimmunising Wart Hogs.—*

To note the effect of hyperimmunising Wart Hogs.—

Five Wart Hogs were originally inoculated with 5-10 c.cs virulent blood.

Four were subsequently inoculated intramuscularly with virulent blood at the rate of 5 c.cs. per lb. body weight (approximately) and one at the rate of 2½ c.cs per lb. body weight.

RESULT.—

One died of Rinderpest contracted previous to hyperimmunising.

Two were bled to death on the 8th day for serum.

Two are still alive.

Total Five.

(C) *Testing the Potency of sera prepared from hyperimmunised Wart Hogs.*

Six domestic pigs were put in experiment.

Lot 1, consisted of three pigs; each got 2 c.cs virulent blood of a domestic pig and serum at the rate of 1 c.c. per lb. body weight, as well as 100 c.cs, serum during the early stage of the temperature reaction as shewn below: —

643. Weight 153 lbs. 2.c.cs. Virulent blood plus 153 c.c. Serum, plus 100 c.cs, serum.

667. Weight 42 lbs. 2.c.cs. Virulent blood plus 42 c.cs. Serum, plus 100 c.cs, serum.

707. Weight 55 lbs. 2.c.cs. Virulent blood plus 55 c.cs. Serum, plus 100 c.cs, serum.

Lot 2, comprised three pigs; each got 2.c.cs, virulent blood of a Wart Hog plus serum at the rate of 1 c.c. per lb., body weight, as well as 50 c.cs. serum during the early phase of the temperature reaction as shewn below:-

664. Weight 55 lbs. 2. c.cs. Virulent blood plus 55 c.cs. Serum, plus 50 c.cs. serum.
665. Weight 46 lbs. 2.c.cs. Virulent blood plus 46 c.cs. Serum, plus 50 c.cs. serum.
666. Weight 56 lbs. 2.c.cs. Virulent blood plus 56 c.cs. Serum, plus 50 c.cs. serum.

RESULT.—

Each of the six pigs put in experiment gave a well marked reaction and died of Swine Fever.

The conclusions arrived at as the result of the above-mentioned and previous experiments are as follows:—

(1) The Wart Hog is not highly susceptible.
(2) The Wart Hog harbours the virus of Swine Fever in the blood.
(3) The negative results of the *in-contact* experiments seem to indicate that,
    (a) The secretions and excretions (Urine, Faeces, etc.,) of a Wart Hog which is harbouring the virus of Swine Fever in the blood are not infectious.
    (b) The disease is probably transmitted under natural conditions from Wart Hogs to the domestic pig and Wart Hog by ingestion of the carcase of a Wart Hog the blood of which carcase contains the virus of Swine Fever.
(4) Hyperimmunised Wart Hogs do not produce serum of sufficient potency to protect against East African Swine Fever in the domestic pig.

(d). *The transmission of Rinderpest to Bovines by Wart Hogs and vice versa.*

The susceptibility of Wart Hogs to Rinderpest was recorded in the Report for the Year ended 31st March, 1921.

During the period April 1st to December 31st, 1921, a number of Wart Hogs were captured and an opportunity was afforded of repeating the experiments in connection with the susceptibility of Wart Hogs to Rinderpest and of investigating the following, viz.

(a) The transmission of Rinderpest to susceptible cattle by contact with Wart Hogs inoculated with Rinderpest blood.

(b) The transmission of Rinderpest to Wart Hogs by contact with cattle reacting to Rinderpest.

(c) The transmission of Rinderpest to susceptible Wart Hogs by contact with Wart Hogs inoculated with Rinderpest.

(d) To note whether the urine and blood of inoculated Wart Hogs transmits Rinderpest to susceptible cattle.

RESULT.—

(a) One Control placed in contact with Wart Hogs that had received Virulent blood did not contract Rinderpest.

Two other Controls placed in contact with Wart Hogs suffering from Rinderpest reacted and died of the disease.

Control=An animal susceptible to Rinderpest.

One susceptible bovine, placed with Wart Hogs suffering from Rinderpest did not contract the disease.

(b) Two Wart Hogs, (Nos. 94 and 95) placed in an infected house and in contact with another Wart Hog suffering from Rinderpest, did not contract Rinderpest.

(c) Whilst Rinderpest is easily communicable to Wart Hogs by inoculation, it appears more difficult to infect them by contact.

(d) Blood of Wart Hogs inoculated with Rinderpest Virulent blood is virulent and so is their urine.

Wart Hogs which received Virulent Blood subcutaneously died shewing an acute Gastro-enteritis, frequently of a diphtheritic nature.

The experiments and results are shewn in the following Tabulated Sheet, No. 1.

During the course of Swine diseases investigations with the Wart Hog, a number of parasites were collected at time of Post-mortem and forwarded together with parasites collected from the domestic pig to Professor Nuttall. The Molteno Institute for Research in Parasitology, University of Cambridge, for identification.

A mortality in pigs was investigated "in loco" in the Naivasha and Gilgil areas.

In the former instance, the existence of Swine Fever was confirmed by inoculation of blood to susceptible domestic pigs.

In the latter case, Anthrax was confirmed microscopically.

Besides this, blood was received from various sources for confirmation of diagnosis or otherwise of the existence of Swine Fever.

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2. PLEURO-PNEUMONIA CONTAGIOSA BOVUM INVESTIGATIONS.—

(1). *The Diagnosis of Pleuro-pneumonia contagiosa bovum (Lungsickness).*

The clinical diagnosis of the acute form of Pleuro-pneumonia in the living animal often presents difficulties and is apt to be confused with other maladies.

This is more particularly so when isolated cases occur in a herd in which other diseases with pulmonary complications exist.

The *sub-acute or chronic* form of Lung-sickness in the living animal in many instances escapes observation and is often confused with Pulmonary disorders, particularly those produced by invasion of the lungs with Echinococcus and other parasites.

Although the pathological changes which occur in the lungs are more or less characteristic, the naked eye examination is sometimes insufficient to enable a definite decision to be arrived at, but since the virus of Pleuro-pneumonia produces specific changes which are recognisable microscopically, it has been the custom when any

doubt has existed to forward specimens to the Laboratory for confirmation of diagnosis or otherwise.

It is generally held that the chronic or sub-acute cases (Old Lungers) may be responsible for the spread of infection and hence the importance of introducing a test which would be practical of application, and by means of which it would be possible to differentiate between affected and non-affected cattle; indeed any method other than the "Stamping out" one made use of for the purpose of eradicating Pleuro-pneumonia should provide for the detection of all affected animals of a herd.

The introduction of a Serological test for the diagnosis of Pleuro-pneumonia in the living animal has engaged the attention of several investigators but with one exception in which the Authors claim that the Complement Deviation method carried out according to their directions offers a useful means for the diagnosis and eradication of Pleuro-pneumonia, no results of a serviceable character were obtained.

In 1921, it was decided to commence experiments with the object of introducing a test. Taking into consideration the difficulties which would be experienced in obtaining small animals which are necessary for the carrying out of the Complement Deviation test, it was decided to investigate the applicability of other methods viz, (a), Conglutination (b) Precipitation.

The Conglutination test was introduced some years ago and is made use of as a complementary test in the diagnosis of Glanders in Equines.

The literature does not record experiments having been carried out to determine its value in Pleuro-pneumonia or other Bovine affections.

The Precipitation method is sometimes employed in the serum diagnosis of various diseases.

In March 1921, Mr. S. H. Whitworth, Veterinary Officer, was transferred from the Field to Kabete Laboratory. On arrival this Officer was detailed to assist the Veterinary Pathologist and was instructed to continue the experiments in connection with the diagnosis of Pleuro-pneumonia during the absence on leave of the latter.

Some difficulty was experienced in obtaining suitable material, such as fresh serum from suspected and infected animals.

Nevertheless, a number of tests were carried out and progress made, and in order to overcome the difficulty, arrangements were made on the return of the Veterinary Pathologist, for the purchase of a number of affected animals, and their despatch to the Laboratory under supervision.

On the return of Mr. J. Ford, Laboratory Assistant, from Leave in November, the Veterinary Pathologist was in a position to continue the serum diagnosis experiments in which Mr. Whitworth assisted.

A considerable amount of Research and experimental work has been carried out in connection with the foregoing, the details and results of which will be furnished in a separate Report.

2. *Field experiment to determine the immunity to natural infection conferred by inoculation of.—*

(a) Pure culture vaccine.
(b) Virus.
(c) Pure culture vaccine and virus.

The Pure culture vaccine was prepared at the Kabete Laboratory.

The virus utilised was of various local strains and with few exceptions, obtained by passage of a strain of virus through susceptible cattle.

Exceptionally, virus from a naturally infected animal was made use of.

In March 1921, it was decided to expose some cattle in an infected Pleuro-pneumonia herd, for the purpose of determining the immunity conferred against natural infection by inoculation. In March of that Year the Veterinary Pathologist visited N'Garuya's Manyatta which is situated in the Masai Reserve about 25 miles distant from N'gong Boma in order to definitely ascertain whether Lung-Sickness existed among the native owned

cattle of the Manyatta, with the result that two animals shewing acute symptoms of Pleuro-pneumonia were detected.

From the history of the outbreak as furnished by the Owner, and on inspection of the cattle, it was concluded that a number of "old lungers" existed in the herd of approximately 600 head.

The native Owner having consented to the herding and bomaing of the experimental animals with the cattle of the Manyatta on payment at the rate of 25 cents per head, per Month, arrangements were made to despatch from the Laboratory 66 cattle, 48 of which had been inoculated at Kabete on various dates, the remainder had not been inoculated. They arrived at the Manyatta on the 3rd April, 1921.

Previous to despatch, each animal was distinctly branded with a Laboratory and Serial number and its description recorded. A tabulated sheet was compiled shewing particulars and dates of inoculation.

In order that the experimental animals would be under European observation, Stock Inspector H. J. Vernon, was stationed in the vicinity of the Manyatta and instructed to regularly inspect the cattle and furnish a report thereon.

Although, subsequent to the Veterinary Pathologist's visit in March 1921, a few cases of suspected Pleuro-pneumonia were reported amongst the native-owned cattle of the Manyatta, it was not possible to confirm this by Post-mortem examination, the Natives not being disposed to report the death of their own animals.

In September 1921, Pleuro-pneumonia was found to be active amongst the herd of native-owned cattle at Sironga's Manyatta, which is situated in the Masai Reserve about 7 miles from the N'gong Boma and since no cases of Pleuro-pneumonia had been observed amongst the experimental cattle at N'Garuya's Manyatta, it was decided to arrange for the removal of the experimental cattle to Sironga's Manyatta, to be herded and bomaed with the infected mob.

In September 1921, The Veterinary Pathologist visited Sironga's Manyatta and found a large number of the native-owned cattle, which totalled, approximately, 800 head, visibly affected with Pleuro-pneumonia.

On the 28th September 1921, the experimental cattle which, as previously mentioned, had been herded at N'Garuya's Manyatta since the 3rd April, 1921, were removed to Sironga's Manyatta and further lots of inoculated and non-inoculated cattle were despatched on subsequent dates from the laboratory to the latter.

The following particulars are shewn in tabulated form below, viz :—

(1) The number of inoculated and non-inoculated cattle which have been put in experiment.
(2) Dates of their despatch from the Laboratory.
(3) Material used for inoculation.
(4) The total number died or destroyed.
(5) Cause of death.

TABULATED FORM No. 2.
PRECIS PLEURO-PNEUMONIA
IMMUNITY EXPERIMENT.
(Masai Reserve).

STATEMENT SHEWING NUMBER OF BOVINES PUT IN EXPERIMENT AND OTHER PARTICULARS.

Lot No. and date of despatch.	No. inoculated with vaccine and virus.	No. inoculated with virus only.	No. inoculated with vaccine only.	No. of non-inoculated lot.	Total number despatched.
No. 1. (1.4.21)	12	0	36	18	66
No. 2. (13.10.21)			11	9	20
No. 3. (29.11.21)	2	1	11		14
No. 4. (12.1.22)	2	7	11	8	28
TOTALS	16	8	69	35	128

TABULATED FORM No. 3.
PRECIS PLEURO-PNEUMONIA IMMUNITY EXPERIMENT.
(Masai Reserve).

(*Continued*).

SHEWING NUMBER OF EXPERIMENTAL ANIMALS WHICH DIED OR WERE DESTROYED.

Lot No.	Destroyed.	Died.	Total.
1	6	10	16
2			
3		4	4
4	1		1
TOTALS	7	14	21

LABORATORY NUMBERS OF ABOVE :—

Lot No. 1.

Destroyed and found affected with Pleuro-pneumonia. 4
Nos. 6916; 6918; 6815; 6896.
Dates 25-11-21; 19-12-21; 20-12-21 and 18-1-22; respectively.

Died. Cause of death Pleuro-pneumonia. 1
No. 6941. Date 23-12-21.

Died from causes other than Pleuro-pneumonia. 9

Destroyed for causes other than Pleuro-pneumonia. 2

TOTAL 16

Lot No. 2.

Nil.

Lot No. 3.

Died from causes other than Pleuro-pneumonia. 4

Lot No. 4. Destroyed for causes other than Pleuro-pneumonia.	1
GRAND TOTAL.	21

The following is a Summary of the result of the experiment up to the 18-1-22.

(1) Five of the non-inoculated cattle contracted Pleuro-pneumonia, the diagnosis being confirmed by microscopic examination of the lesions.
(2) Pleuro-pneumonia has not been detected amongst the inoculated cattle.

The experiment is being continued for the purpose of determining for what period inoculated animals remain refractory to natural infection.

3. EXPERIMENTS TO NOTE THE EFFECT OF INJECTION OF TRYPANBLUE IN P. BIGEMINUM (REDWATER) INFECTION IN CATTLE & P. CANIS (TICK FEVER) IN THE DOG.

In 1921, a sample of Trypanblue was received from the Maker, through the Crown Agents, London, requesting that its efficiency be determined and reported on.

Arrangements were made for the carrying out of the test, the outline of the investigations being as follows :—

(1) To note the effects of injection of Trypanblue, Lots 1 & 2 of the same make referred to below as 0.1 & 0.2, respectively.
(2) To compare the effects of injection of Trypanblue, Lots 0.1 & 0.2 respectively with that of another make referred to below as L.B.

It was recognised that natural recovery usually occurs in young calves and that it is usual to find in these, when reacting to Redwater, only a small percentage of cells invaded with parasites. Consequently it would be difficult to differentiate between a natural recovery and the curative effects of Trypanblue and it was decided to obtain, if possible, susceptible cattle other than calves, preferably adults, but, unfortunately, these were not obtainable for the following reasons, viz.,

(1) Cattle born and reared in the Colony usually contract Redwater within a few weeks after birth.

(2) Cattle introduced for stud purposes, *e.g.*, from South Africa are, as a rule, immune. Cattle recently imported from Great Britain were not available.

Susceptible animals being unobtainable, cattle varying in age from two to three years, which were at the time undergoing Rinderpest immunisation, were utilised. They had recovered from Redwater, but a recurrence consequent on the Rinderpest reaction occurred in some of these.

Smears were examined daily during the Rinderpest reaction and when P. bigeminum parasites were detected, a count was made of the number and types present in twenty fields and recorded. Trypanblue was then injected and a count made on various occasions after injection. The morning and evening temperatures and clynical symptoms were daily recorded.

Several young puppies were also put in experiment. They were inoculated with Virulent blood, smears were collected daily after inoculation, and the number and types of parasites recorded prior to and after injection of Trypanblue. Unfortunately some were found to be immune and the Control Dog survived, the virus being, apparently, not of a markedly virulent strain. It was thus difficult to differentiate between a natural recovery and the curative effect of the Trypanblue.

Preparations of Solutions.—

As mentioned above three Lots were utilised, viz :-

Lot O.1. received on the 12-2-21, in the form of fine crystals packed in a glass tube, corked.

Lot 0.2. received on the 24-11-20 in the form of fine crystals packed in 2 oz amber coloured bottles.

Lot L.B. received on the 24-11-20 in the form of coarse granules packed in a tin canister.

1½ and 3 grammes, respectively, of each Lot were put in 100 c.cs. of boiling distilled water and thoroughly stirred. After cooling the solutions were filtered through filter paper, the filtrate furnished the material for injection.

The following freshly prepared doses were injected :—

Lot 0.1.(a) *Subcutaneously.*—

Experiment 1. 100 c.cs. of a solution of 1½ grammes in 100 c.cs. of water.

Experiment 2. 100 c.cs. of a solution of 3 grammes in 100 c.cs. of water.

(b) *Intravenously.*

Experiment 3. 50 c.cs. of a solution of 1½ grammes in 100 c.cs. of water.

Lot 0.2 (a) *Intravenously.*

Experiment 4. 50 c.cs. of a solution of 1½ grammes in 100 c.cs. of water.

Lot L.B. (a) *Subcutaneously.*

Experiment 5. 100 c.cs. of a solution of 3 grammes in 100 c.cs. of water.

Experiment 6. 100 c.cs. of a solution of 1½ grammes in 100 c.cs. of water.

(b) *Intravenously.*

Experiment 7. 50 c.cs. of a solution of 3 grammes in 100 c.cs. of water.

Lot 0.1 *followed by Lot D.B.*

EXPERIMENT 8.

(a) *Subcutaneously.*

100 c.cs. of a solution of 3 grammes of Lot 0.1 in 100 c.cs. of water followed 2 days later with

(b) *Intravenously.*
70 c.cs. of a solution of 3 grammes of Lot L.B. in 100 c.cs. of water.

EXPERIMENT 9.

(a) *Intravenously.*
100 c.cs. of a solution of 1½ grammes of Lot 0.1 in 100 c.cs. of water followed 2 days later with

(b) *Intravenously.*
70 c.cs. of a solution of 3 grammes of Lot L. B. in 100 c.cs. of water.

The following freshly prepared doses were injected in puppies :—
Lot 0.1 followed by Lot L.B.

EXPERIMENT 10.

(a) *Subcutaneously.*
10 c.cs. of a solution of 1 gramme of Lot 0.1 in 100 c.cs. of water followed a day later with

(b) *Subcutaneously.*
1½ c.cs. of a solution of 3 grammes of Lot L.B. in 100 c.cs. of water.

EXPERIMENT 11.

(a) *Subcutaneously.*
10 c.cs. of a solution of 1 Gramme of Lot 0.1 in 100 c.cs. of water followed 3 days later with

(b) *Subcutaneously.*
3 c.cs. of a solution of 3 Grammes of Lot L.B. in 100 c.cs. of water.

(a) *Subcutaneously.*
10 c.cs. of a solution of 1 Gramme of Lot 0.1 in 100 c.cs. of water followed on the following day with

(b) *Subcutaneously.*

2 c.cs. of a solution of 3 Grammes of Lot L.B. in 100 c.cs. of water.

GENERAL SUMMARY.—

The following was submitted :—

Experiments with Cattle.—

(1) Suitable susceptible cattle were not available. It is suggested that the experiments be repeated in a country where susceptible cattle and dogs are the more easily obtainable.

(2) Cattle recovered from P. bigeminum infection in which a recurrence occurred as a result of the Rinderpest reaction, were utilised.

(3) *Lot* O.1. *Number in Experiment* 3.

(a) Parasites still present on the 21st hour after injection and in one case on the 42nd hour.

(b) With one exception (3 gramme dose) no bluish discolouration produced.

(c) No degeneration of parasites.

(d) Animals survived.

(4) *Lot* O.1. *Number in Experiment* 1.

(a) Parasites still present on the 21st hour and 24th hour; none seen at the 43rd hour.

(b) No bluish discolouration.

(c) No degeneration of parasites.

(d) Animal recovered.

(5) *Lot L.B. Number in Experiment* 3.

(a) Few, if any, parasites seen on the 21st hour and the 42nd hour and at subsequent dates after injection.

(b) Distinct bluish discolouration produced.

(c) Animals survived.

(6) *Lot* O.1. *followed by Lot L.B. Number in Experiment* 2.

(a) Parasites seen up till the 21st hour after injection of Lot O.1; none seen at the 42nd hour.

(b) No bluish discolouration.

(c) No degeneration of parasites.

(d) On the 48th hour after injection of Lot O.1; got Lot L.B., which produced a distinct bluish discolouration of the visible mucous membranes.

(e) Parasites decreased or disappeared after the latter injection.

(f) Animals survived.

(g) Less local swelling produced by Lot L.B.

Experiments with dogs.—

(7). (a) The strain was, apparently, a mild one. The Control animal survived.

(b) Only a small percentage of red cells were invaded.

(c) *Lot* O.1 *followed by Lot L.B. Number in Experiment* 4.
Few parasites seen before or after injection.

(d) No bluish discolouration.

(e) Lot L.B. produced a distinct discolouration.

(f) Less local swelling produced by Lot L.B.

(g) Animals survived.

(8) The desirability of preparing Trypanblue in a coarsely granular instead of fine crystal form in order to reduce the surface area and hence the action between the atmosphere and the substance.

Advantage was taken of further opportunities of noting the effects of Trypanblue in cattle in which a recurrence of Redwater consequent on the Rinderpest reaction occurred, several untreated animals serving as Controls.

The results tend to show that spontaneous recovery usually takes place and that parasites may disappear within 24 hours from the peripheral circulation in untreated animals in which a large percentage (80%) of cells were invaded.

The difficulty of differentiating between a spontaneous recovery and the curative effects of Trypanblue in breakdowns to Redwater is again indicated.

4. TUBERCULIN TESTS IN CATTLE.—

Observations have shewn that, whereas in healthy unhoused animals in tropical climates, the early morning temperature shews no marked variations from the normal, it is usual to find later in the day, a higher temperature than in the case of non-exposed healthy cattle and for this reason, it has been the practise on this Station for some time past to record only early morning temperatures in unhoused animals.

On several occasions since 1919, cattle have been subjected to the subcutaneous tuberculin test at Kabete Laboratory, the method of carrying out the test being as follows, viz:—

(a) The cattle are housed, kept at rest, and put on Morning and Evening temperatures for some days.

(b) When a regular temperature curve is recorded, temperatures are taken every three hours between 6 a.m. and 9 p.m. during the 36 hours prior to and for a similar period after injection.

It was noted during the course of these tests that variations in the temperature occurred during the day in healthy housed cattle, and at the request of the Veterinary Pathologist, Mr. R. L. Creery, Veterinary Officer, Kenya Colony, who was at the time temporarily stationed at the Laboratory for a course of instruction, was detailed to make further observations and report thereon.

The outline of investigations being as follows:—

To note the effects of:—

(a) The type and structure of buildings.
(b) The position of the building.
(c) The variations of the external temperature.
(d) Other Telluric conditions.

The variations which occurred in the temperature of the buildings during the period that cattle were undergoing the tuberculin test, were recorded in the case of the Kabete tests, but unfortunately, in those carried out in the Field no record was taken.

The following types of buildings were utilised:—

(1) *At Kabete Laboratory.*—

(a) Corrugated iron building of the following dimensions, viz:—

Size 64 x 27 feet.
Height from floor to ridge of roof 20 feet.
Roof sloping to walls 10 feet high.
The building contains 12 loose boxes in each of which 2 cattle were accommodated.
Ventilation provided by means of louvre boarding along the top of the roof and an open space of 2 feet at the eaves.
Position of building:—*Facing West.*

(b) *Corrugated iron building.*—
Size. 60 feet by 45 feet.
Height from floor to ridge of roof 15 feet.
Roof sloping to walls 6 feet high.
The building which contained no stalls or loose boxes was divided by a passage down the centre into two portions, in each of which cattle were accommodated.
An open space of two feet at the eaves and several doors permitted of abundance of ventilation.
Position of building.—*Facing East & West.*

(2) *In the Field.*—

(c) Thatched roof building.—
Height from floor to ridge of roof 12 feet.
Roof sloping to walls constructed of rough timber 6 feet in height.
Building contained loose boxes each of which accommodated one animal.
Position of building.—*Facing North & South.*

(d) Wood and iron building, corrugated iron roof.

Height from floor to ridge of roof 15 feet.
Roof sloping to walls 8 feet high, constructed of rough wooden posts (not close fitting).
Accommodated 22 stalled animals.
Position of building.—*Facing East & West.*

(e) Lean to, Wood and iron, roofed with corrugated iron.
Height of building at head of stall 10 feet.
Height of building at rear of stall 6 feet.
Walls constructed of rough wooden posts.
Accommodated 37 cattle.
Position of building.—*Facing North & South.*

(f) Open shed, roofed with corrugated iron.
Height from floor to ridge of roof 20 feet.
Roof sloping to walls 6 feet high, of wooden posts 6 feet apart, gables of dry papyrus grass.
Building divided by a partition.
Position of building.—*Facing East & West.*

The following observations were recorded.—

(1) Thatched roof wooden buildings appear to be most satisfactory in so much that a more or less even temperature is recorded.

(2) Iron and wood buildings shew that the height and position of the buildings are of first importance. The height should be not less than 15 feet with walls of not less than 8 feet, and in order to avoid exposure of the length of the building to the sun, it should not face East or West. In building (type B) which was divided into two portions, one of which faced East the other West, the temperature of the Eastern portion registered 4° Fahr. higher up till noon than that of the Western side, whereas at 3 p.m. the temperature of the Western portion registered 4° Fahr. higher than the Eastern portion. At midday the temperature was similar on both sides of the building.

(3) The "Lean to" type with corrugated iron roof is unsatisfactory owing to the low roof usually met with in this type. A thatched roof would probably be more satisfactory.

(4) The "open shed" type is quite good provided the animals are not directly exposed to the sun, and the roof is of sufficient height and width.

(5) Rain has a most marked effect on the lowering of the house temperature which causes a decrease of the body temperature in the housed cattle.

(6) A comparison of the body temperature of housed animals taken at a similar hour, viz., 9 p.m. on different days, shows that rainfall occurring between 6 p.m. and 9 p.m. produced an average decrease of 1.9° Fahr. in forty-one cattle under observation.

The average decrease of temperature between 6 p.m. and 9 p.m. when no rain fell, was found to be 5° Fahr.

(7) A comparison of the house temperature of the type of building described above, under (a) was practically always recorded at 3 p.m., provided climatic conditions remained the same, the highest average body temperature of cattle was in 62% of cases recorded at 6 p.m., *i.e.*, three hours after the highest house temperature. The temperature charts of 167 cattle, taken at the Veterinary Laboratory in buildings of the type (a) and (b) respectively, during the summer months of 1919, shewed that the percentage of highest temperature was as follows :—

6 a.m. 1 % 9 a.m. 2% 12 noon 5%
3 p.m. 24% 6 p.m. 62% 9 p.m. 5%

(8) Whereas the highest house temperature of building type (a) was practically always recorded at 3 p.m., provided climatic conditions remained the same, the highest average body temperature of cattle was in 62% of cases recorded at 6 p.m., *i.e.*, three hours after the highest house temperature.

(9) The lowest recorded average of the body temperature of cattle housed in buildings type (a), show that the evening temperature averages 1.4° Fahr. higher than the morning.
In type (b) the difference was found to be 2.4° Fahr.

(10) For every degree rise of house temperature, on an average a rise of .06° Fahr. body temperature was found to occur.

It has recently been suggested that the subcutaneous Tuberculin test carried out under Field conditions, *e.g.*,

(1) Lack of suitable housing accommodation.

(2) Lack of facilities for feeding and watering housed cattle which necessitated their being disturbed and exposed when undergoing the test was unreliable. An opportunity was recently afforded of confirming this, *viz.* :

On the 8th October 1921, it was decided to forward to Kabete five head of cattle which had been subjected to the subcutaneous Tuberculin test on the 17th September 1921, on an Estate on which the above mentioned conditions existed, and as a result of which, a temperature reaction was recorded which was considered to be positive for Tuberculosis.

On arrival, the cattle were suitably housed and put on morning and evening temperatures for three days, subsequent to which the temperatures were recorded every three hours betwen 6 a.m. and 6 p.m. for three days. On the 15th October 1921 they were injected intra-palpebrally each with ½ cc. of Tuberculin concentrated 50%, and three days later subcutaneously with 4 cc. of Camden Town Tuberculin in the Conjunctival sac.

No local or temperature reaction occurred.

Two of the five were then slaughtered, and on Post-mortem one was found affected, the diagnosis being confirmed microscopically. No visible lesions of Tuberculosis were found in the other animal.

Transmisson experiment to Guinea pigs with scrapings of Lymphatic glands collected from the latter were negative.

On the 9th January 1922, the remaining three were re-tested ; on this occasion ¼ cc. of ordinary Camden Town Tuberculin non-concentrated was injected subcutaneously in the lower lid of the right eye, one dose of Opthalmic Tuberculin, obtained from another source subcutaneously in the lower lid of the left eye and 4 cc. ordinary Camden Town Tuberculin subcutaneously behind the shoulder.

One of the animals C.7726, gave a definite reaction to the Camden Town Tuberculin, but no reaction to the intra-palpebral inoculation of the Opthalmic Tuberculin, and a rise of temperature of 3° Fahr. above normal was recorded on the 18th hour, the others gave no indication of a reaction. All three were then slaughtered ; on Post-mortem C.7726 was found affected, the remaining animals shewed no lesions.

Further tests are being carried out to determine the value of the intra-palpebral method with a view to its substitution, or otherwise, for that of the subcutaneous method where suitable conditions for the carrying out of the latter do not exist.

5. *Anaplasmosis (Genuine Gallsickness) of cattle.*—

In the Annual Report of the Veterinary Pathologist for the year ended March 31st 1921, the results of experiments to ascertain whether Sheep could be utilised as Gallsickness vaccine producers were recorded.

The experiments were repeated during the period under review and the results confirm those previously obtained, *viz.* :—

(a) Blood of Sheep which had been inoculated with Anaplasma marginale blood of a Bovine does not produce Anaplasmosis in susceptible cattle.

(b) The latter when subsequently inoculated with Anaplasma marginale blood of a Bovine react to Anaplamosis.

It is thus reasonable to conclude that since susceptible cattle do not react to Anaplasmosis when inoculated with the blood of Sheep which had previously been inoculated with Anaplasma marginale blood of a bovine, but react to a subsequent inoculation of Anaplasma marginale blood of a Bovine, no immunity is conferred by the Sheep blood and consequently the utilisation of Sheep as vaccine producers is not of value.

6. *Redwater-Gallsickness vaccine* .—

On the arrival of the two previously referred to Hereford Heifers it was decided to ascertain

(1) *Whether their blood was still virulent for both Redwater and Gallsickness.*

Eight young bulls, varying in age from two to eight months belonging to the Government Experimental Farm, Kabete, were kindly placed at our disposal. Four were inoculated each with 5 ccs. citrated blood and the remaining four each 5 ccs. defibrinated blood, collected two hours previously from one of the Hereford Heifers. They were kept under observation and the temperature recorded daily. Smears were collected, when a rise of temperature occurred, and examined.

RESULT.—

(a) Each of the Bulls gave a mild reaction to Redwater and recovered without treatment.

(b) No indication of a reaction to Anaplasmosis was detected either as regards the temperature or clinical symptoms.

It has been noted in some instances that no indication of a reaction to Anaplasmosis, either as regards the temperature or clinical symptoms occurs in young susceptible calves when inoculated with Redwater-Gallsickness blood. Nevertheless, Anaplasma parasites may appear in the peripheral circulation and be the only evidence of a reaction.

Unfortunately, smears were not collected in the case of the eight young Bulls and it will be necessary to repeat the experiments to determine the virulency or otherwise of the blood of the Hereford Heifers for Anaplasmosis.

(2) *Determination of the period during which blood of Hereford Heifers remains virulent after collection for Redwater and Anaplasmosis.*

As the result of experiments carried out in South Africa it is recorded that the blood loses its infectivity for Redwater within a short time and at a later period for Anaplasmosis, after collection. The directions for use of the vaccine recommend that the blood be used within a certain time after despatch.

The determination of the period during which Redwater-Gallsickness vaccine retains its virulency for both infections, under East African conditions, is of importance as owing to the distance which Estates are, in many cases, situated, and the lack of expeditious transport, it is difficult to ensure blood reaching its destination within 24 hours after despatch.

It is hoped to obtain susceptible cattle of a suitable age, to carry out this investigation.

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7. COLON BACILLOSIS.—

Up to the year 1915 or so, this disease was scarcely, if at all, recognised as a responsible factor in calf mortality ; and although there appears to be no doubt that the disease did exist in the Colony previous to that time, it was not until investigations were undertaken in that year that the full extent of its ravages became evident. A large number of the Dairy Farms in the country were found to be infected and in some instances the death rate was very serious indeed.

In 1916 an experimental vaccine for the disease was produced at Kabete and its application in the field gave very reassuring results. The demand for this vaccine rose from 1,982 doses in 1916 to 7,900 doses for 1921, and reports on its efficacy have, on the whole, been very satisfactory.

One instance was brought to our notice, where, in spite of the application of this vaccine, calves kept dying of a disease resembling Colon Bacillosis. Investigation however, revealed that the cause was not due to the Colon Bacillus, although the symptoms and post-mortem

changes were very indicative of those produced by it—but to an organism morphologically similar although biologically different thereto. A special vaccine was prepared and issued containing the organism isolated from the outbreak. The results of its use have not yet come to hand.

Similar but rare experiences to this have previously been observed and it has also been the experience of Investigators in other countries, who report from time to time that while the Bacillus Coli is mainly responsible for so called White Scour of calves, other microbes have been responsible on rare occasions.

8. INFECTIOUS BOVINE ABORTION.—

No less than nine herds were found to be affected. This figure, in all probability, does not give the true state of affairs as to the prevalence of the disease in the country, since many owners, and particularly natives, do not report its occurrence.

A number of non-pregnant Cows and Heifers were inoculated with a living culture prepared at the Laboratory and the elaboration of a method for the inoculation of in-calf Cows and Heifers is receiving attention.

9. ABORTION IN MARES.—does not appear to be prevalent. In November the cause of this complaint in a large stud consisting mostly of Pure-bred imported animals was investigated.

From the history of the outbreak and investigations made "in loco" three possible causes of the complaint entered into consideration :—

(1) *That the disease is contagious* :—

In support of this theory is the fact

(a) that Abortions in Mares had not occurred on this Estate previous to the importation of new blood from South Africa and elsewhere. While against the theory,—if we accept the cause to be due to the Bacillus Abortive Equines—we find,

(a) no history of the occurrence of Joint-ill in foals,

and

(b) the failure to isolate this Bacillus from one foal received at the Laboratory,

and

(c) the longish gestation periods.

(2) *That it is due to Ecbolic substances in the food or water* :—

No Ergot could be seen on the Flora of the Paddock where the Mares ran out and samples of mud collected from the water supply in this paddock failed to cause abortion in a pregnant Cow fed with large quantities ; neither did it contain anything likely to cause Abortion in Cattle.

(Report of the Chemical Department).

(3) *That it is due to Mechanical or Nervous influences* :—

It was thought that the dipping of the Mares might have brought about the Abortions, but the first Mare that aborted was never dipped and the six Mares which foaled normally were dipped to almost foaling time, and they were as highly bred and presumably as sensitive as those that aborted.

10. TRYPANOSOMIASIS.—

The value of injections with one gramme doses of Tartar Emetic (10 injections) and seven grammes doses of Atoxyl (5 injections) was demonstrated in a case of Trypanosomiasis probably of the Congolense Type.

11. KIKUYU FOWL DISEASE.—

(a) *Preparation of Anti-Serum* :—

(1) *Experiment* 1312.—The effect of Anti-serum produced in Equines in the treatment of the disease :—

The serum was produced by hyperimmunising horses and mules with increasing doses of virulent cultures of the disease, injected intra-jugularly.

The Fowls were inoculated subcutaneously and simultaneously with the serum and virus.

No. of fowls inoculated	Amount of Anti-Serum used.	Amount of Living K.F.D. bacteriæ used.	Result.
Batch (1).			
Ten.	2 c.cs.	5 million.	Nine of the 10 fowls died.
Batch (2).			
Eight.	5 c.cs.	5 million.	100% died.
Batch (3).			
Seven.	10 c.cs.	5 million.	Six of the seven Fowls died.
Batch (4). Controls.			
Two.	None.	5 million.	Both died.

SYNOPSIS.—

Equine Anti-Serum is not efficacious against Kikuyu Fowl Disease in doses up to 10 c.cs.

(2) *Experiment* 1353.—Immunisation of Fowls with virulent culture plus Anti-serum produced in Goats and Sheep.

The Anti-serum was produced by hyperimmunising Goats and Sheep with increasing doses of virulent culture injected intra-jugularly.

Both the serum and culture were inoculated subcutaneously and simultaneously, with the following results :—

No. of fowls inoculated	Amount of Anti-serum used.	Amount of Living K.F.D. Bacteriæ used.	Result.
Batch (1).			
Three.	10 c.cs.	1 million.	2 died of K.F.D. as result of inoculation.
Batch (2).			
Three.	5 c.cs.	1 million.	All died as result of inoculation.
Batch (3). Controls.			
Two.	None.	1 million.	Both died

SYNOPSIS.—

Sheep and Goats Anti-Kikuyu Fowl Disease serum is not effective in the immunisation of Fowls at the doses employed.

(b). *Experiment* 1334. Do faeces of Fowls, sick with Kikuyu Fowl Disease, convey the disease when food is contaminated with it?

Six susceptible fowls were placed in an isolated box and their food (Mealie Meal) was saturated, for three days, with faeces of fowls reacting to the disease.

Three of the six birds died of the disease in six, nine and ten days, respectively, from the last day of feeding ; while the remaining three failed to sicken and were subsequently found susceptible, on being inoculated with a virulent culture of the Bacillus.

(c) *Experiment* 1363. Testing the susceptibility of Fowls imported from South Africa to Kikuyu Fowl Disease.—

The Fowls were imported from Pretoria and up to the time of the test they lived under healthy conditions and free from Kikuyu Fowl Disease.

Four South African and three local fowls were used.

(1) Two of each received virulent culture by the mouth with the result that both the local Fowls died of Kikuyu Fowl Disease and the South African proved resistant to the infection.

(2) The remaining Fowls, (two South African and one local) each received a massive dose (100 million Bacteriæ) of Virulent culture subcutaneously. The local Fowl died five days afterwards of Kikuyu Fowl Disease, while one of the South African birds proved completely resistant and the other died as late as 13 days after inoculation.

SYNOPSIS.—

Fowls imported from the Pretoria district of South Africa are highly resistant to Kikuyu Fowl disease.

(d) *Experiment* 1343. Can lice, collected from fowls suffering from Kikuyu Fowl Disease transmit the disease to healthy susceptible Fowls?

One Fowl was isolated for the purpose and on three occasions, at about a week's interval, lice were collected off birds dying of Kikuyu Fowl Disease and placed on its skin directly.

No reaction of any kind occurred and the bird was found susceptible to Kikuyu Fowl Disease subsequently.

(e) *Experiment* 1337. The effect of a Liver Emulsion Filtrate (Berkfield) of a Fowl, dead of Kikuyu Fowl Disease, on healthy Fowls ?

Three healthy birds were each injected subcutaneously with 5 c.cs. of Filtrate (diluted 1 in 5), which had been tested and found free of Bacteriæ, and two fowls (Controls) were inoculated with 1 c.c. of the same liver emulsion unfiltered. Both Control Fowls died of Kikuyu Fowl Diseasee while none of the other three gave a reaction and were subsequently found susceptible to the disease.

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12. RINDERPEST.—

(1) *The recurrence of P. bigeminum infection (Redwater) in cattle undergoing Rinderpest immunisation and the percentage of cases in which parasites disappeared from the peripheral circulation and recovery took place without treatment.*

It is sometimes noted that a breakdown in immunity to Redwater occurs in cattle undergoing Rinderpest immunisation.

Observations were carefully made and recorded in 36, immune to Redwater, Kome Island cattle undergoing Rinderpest immunisation in connection with the potency tests of various brews of serum.

Smears were collected during the Rinderpest reaction and examined for the presence of P. bigeminum parasites.

The results shew :—

(a) that in 25 cattle = 70%, approximately, P. bigeminum parasites were observed.

(b) that in 22 cattle = 80% a spontaneous disappearance of the parasites from the peripheral

circulation and recovery without treatment occurred.

(c) in the remaining three animals treated with Trypanblue, the parasites disappeared from the peripheral circulation within 24 hours with one exception, where a few were observed later.

(2) *Potency tests.*—

Kome Island or Grade cattle were utilised for testing the potency of various brews of serum.

For each test Nine cattle were put in experiment, *viz.* :—

3 at the rate of 15 c.cs. per 100 kilos body weight plus 2 c.cs. Virulent blood.

3 at the rate of 20 c.cs. per 100 kilos body weight plus 2 c.cs. Virulent blood.

3 at the rate of 30 c.cs. per 100 kilos body weight plus 2 c.cs. Virulent blood.

The Kome Island cattle were found to be more suitable for the purpose inasmuch as they were highly susceptible with little or no variation in Virulency whereas in the Grade cattle inoculated with similar doses of the same brew of serum the nature of the reaction varied, some giving a severe, others a mild or not visible reaction.

(3) *Testing the virulency of 48 and 24 hours old blood respectively.*

The results of previous experiments shewed,

(a) that fresh virulent blood and varying rates of anti-Rinderpest serum produced a reaction to Rinderpest followed by immunity.

(b) that 30 and 40 hours old and varying rates of anti-Rinderpest serum produced in a percentage of susceptible cattle no reaction and no immunity.

(c) that 30 and 40 hours old blood alone produced a reaction.

The experiments were repeated with 48 and 24 hours old blood, respectively, and varying doses of Anti-Rinderpest serum.

RESULTS.—

A percentage of cattle inoculated with 48 and 24 hours old blood and varying rates of Anti-Rinderpest serum did not react and when tested on their immunity were found to be susceptible.

The experiments confirm the results previously arrived at, and recommendation made, *viz.* :—that the use of fresh Virulent blood in Rinderpest immunisation operations is of fundamental importance.

(4) *To note the effect of inoculation of large doses of Anti-Rinderpest serum and 2 c.cs. Fresh Virulent blood.*

(a) 2 Kome Island cattle received serum at the rate of 100 c.cs. per 100 kilos, plus 2 c.cs. Virulent blood. Mild reaction followed and the animals were subsequently proved to be immune.

(b) 2 Grades received serum at the rate of 100 c.cs. per 100 kilos, plus 2 c.cs. Virulent blood ; reactions followed in the usual time.

One animal recovered and was proved to be immune ; the other had a severe breakdown to Redwater and died on the 8th day after inoculation. The blood of this beast, when tested, was proved to contain Rinderpest virus.

(c) 2 Grade beasts received serum at the rate of 150 c.cs. per 100 kilos, plus Virulent blood.

One did not react at all and in the other the reaction was delayed and feeble. These animals were sent to the Laboratory Farm and tested on their immunity about three months afterwards ; they were proved to be immune.

The results strongly indicate that large doses of serum given to susceptible animals produce immunity, provided Fresh Virulent Blood is used.

(5) *To test if Serum extracted from Rinderpest blood is still Virulent.*—

(a) A Control was bled during reaction and the blood allowed to stand for 24 hours ; the serum was then pipetted off, centrifuged and filtered through filter paper on three different occasions. 2 Grade animals each received 5 c.cs. of

this serum, subcutaneously ; reactions, followed by death, resulted.

(b) Virulent blood allowed to stand for 24 hours, pipetted off, diluted 1 in 4 with Citrate and filtered through Berkefield. 2 beasts received subcutaneously, each 20 c.cs. of the diluted serum. No reactions followed.

Serum was then obtained as before, passed through a Berkefield undiluted and inoculated in the above animals. Still no reaction was noted.

Six days afterwards, the same animals received subcutaneously, 10 c.cs. of serum drawn off a reacting Control, centrifuged and passed through filter paper on six different occasions ; both animals gave typical reactions to Rinderpest.

One beast received 10 c.cs. of undiluted serum after filtration through Berkefield "V" candle ; a temperature reaction started on the 7th day.

Another beast received 200 c.cs. of a 1 in 20 serum and Saline after filtration through Berkefield ; no reaction occurred up to the 8th day, and no immunity was conferred.

One other animal received 10 c.cs. of undiluted serum filtered through four layers of filter paper ; no reaction followed up to the 8th day and the animal then developed Rinderpest, which was probably contracted accidentally.

The above results seem to shew that, although in certain cases, Rinderpest can be produced through the inoculation of serum obtained from Virulent blood, infection does not always follow such inoculations, especially if filter candles have been used or the serum been diluted.

13. ULCERATIVE LYMPHANGITIS.—

A Polyvalent vaccine was prepared and used experimentally in the curative treatment of this infection.

In some cases an apparent cure was recorded and the animal returned to its owner. In others a recurrence was noted in apparently cured animals.

14. EPIZOOTIC LYMPHANGITIS.—

Experiments to determine the curative effects of the following given daily were continued, *viz.* :—

Hydrarg Iod : Rub.	1 gramme.
Pot : Iod :	5 grammes.
Aqua	1 ounce.

In some instances an apparent recovery was recorded.

---

15. PSEUDO RABIES.—

On different occasions during 1920, the carcases of animals (Dogs and a Jackal) were forwarded to the Laboratory for examination for confirmation or otherwise of the existence of Rabies.

The history furnished was that the suspected animals had shewn symptoms, *e.g.,* a tendency to attack and bite, hyperexcitability, etc., suspicious for Rabies and for this reason had been destroyed.

In one instance where a dog belonging to one of the Staff of the Station came under observation, the following symptoms were noted, *viz* :— a desire to attack and bite human beings, incoordination of movements, saliva dribbling from the Mouth, change in voice accompanied with a long drawn-out howl resembling somewhat that of a hyena, hyperexcitability ; death eventually occurring.

On the arrival of the carcases, and in the case of the latter animal, the brain was carefully removed, sections and smears prepared from different parts of the brain and after straining examined for the presence of Negri bodies. No Negri bodies were detected in the sections and smears.

Rabbits were inoculated subdurally with an emulsion of the Medulla.

In some instances, some of the Rabbits inoculated with an emulsion shewed after a varying period the following symptoms :— hyper-excitability, Paresis usually of the hind quarters.

Other Rabbits inoculated with portions of the same material remained healthy.

Examination of sections and smears of the brain, collected from the Rabbits, were negative for Negri bodies.

In 1921, another case was brought to our notice.

The history supplied by the Veterinary Officer who attended the case, is as follows :—

Subject, a Collie Dog, was sick for three days during which time it shewed paralysis, loss of voice and biting at all objects in its proximity. The owner stated that the dog was bitten by a Jackall 3 months previously. In the Veterinary Officer's opinion, the symptoms were indicative of dumb Rabies, and he had the animal destroyed and sent to us.

Decomposition was present when the carcase reached us and the Autopsy was otherwise entirely negative.

Two rabbits were each inoculated sub-durally with $\frac{1}{4}$ c.c. of an emulsion of the Medulla Oblongata taken from the suspected dog under aseptic conditions. One rabbit died four days later, presumably of a Septicaemia —the result of the inoculation : (it should be noted that decomposition changes were present in the carcase of the dog, at the time the brain was collected).

The other rabbit developed symptoms of Paresis and excitability, sixteen days after inoculation. These symptoms became gradually more marked and the animal was destroyed with chloroform four days later.

Its brain was collected and two more rabbits inoculated sub-durally with $\frac{1}{4}$ c.c. of an emulsion made with it in saline. In addition, two dogs received 2 c.cs. of the same emulsion, intra-muscularly.

The results of these sub-inoculations were :—

One rabbit, (No. 239) became paralysed and dull 22 days following the injection. It was destroyed four days later for the collection of further material and the microscopical examination of its brain. There was a hypostetic pneumonia at Post-mortem.

The other rabbit remained healthy for a little over one month, when again Paresis of the hind quarters set in. It died some five days later, when congestion of

the meninges of the brain was noticed, near the site of inoculation. No other lesions could be seen except that the carcase seemed underfed.

Both dogs remained healthy and were discontinued from the experiment two months after inoculation.

Two rabbits were again inoculated sub-durally with the brain emulsion of rabbit No. 239, but both failed to shew any symptoms resembling Rabies and the experiment was discontinued.

Microscopical examination was carried out on the brains of all rabbits which died, or were killed in the Experiment, as was also the original dog's brain, but no Negri bodies could be detected in any. Impression smears and sections were collected and treated by various agents, in the prescribed ways.

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16. WASTING-SICKNESS. — "Nakuruitis".—

In May 1921, steps were taken to commence investigations with the co-operation of the Director of Chemical Research, into the cause of this condition, which is known to occur in parts of the Colony where the soil is of volcanic origin, and which as the name suggests is characterised by a loss of condition which from the Literature would appear to resemble that described as occurring in certain volcanic areas of New Zealand.

A circular letter was addressed to all Veterinary Officers and Stockowners who were known to have had experience with it.

As a result of the information so obtained, it was decided to select an area of land, close to the Nakuru Township, in which the animals could be exposed.

Arrangements were eventually made with a Settler close to Nakuru, for an area of land adjacent to the Veterinary Quarantine at Nakuru, but unfortunately this gentleman could not eventually see his way to allow us to use this ground.

The Nakuru Sites Board were subsequently approached and they have agreed to allow 200 acres of the North Township of Nakuru to be earmarked for the purpose.

Arrangements are in hand, at the moment, with the Senior Veterinary Officer, Nakuru, as to the water supply for this area.

I have the honour to be
Sir,
Your obedient Servant,
J. Walker,
Veterinary Pathologist.

Appendix "D".

Entomological Laboratory,
Kabete.
2nd February, 1922.

DIVISION OF ENTOMOLOGY.
ANNUAL REPORT 1921.
(April 1st 1921 — December 31st 1921).

THE HONOURABLE,
THE DIRECTOR OF AGRICULTURE.

Sir,

I have the honour to submit, herewith, a report on the work of the Division for the year ending December 31st 1921.

Functions of the Division.—

The report is intended to give merely a general idea of the extent of the work performed by the Division and to serve as a convenient record for data which cannot be published elsewhere. The activities of the Division have comprised :—

1. Detailed studies of the life-cycle of economic insects.
2. Experimental work in connection with the control of injurious insects.
3. Plant Import Inspection.
4. Lectures and demonstrations to Students.
5. The dissemination of advice on insect problems by publications, correspondence, and more particularly, by visits to farms, plantations, orchards, etc.
6. The continuation of the Entomological Survey of the Colony.

7. Experimental work on Sericulture.
8. Special work, in conjunction with the Chief Sanitation Officer, in connection with the distribution of plague rats and fleas.

Staff.—

The Headquarters of the Division are situated on the Government Experimental Farm, Kabete, and the personnel is as follows : —

T. J. Anderson	Chief of Division.
H. Wilkinson	Entomologist.
H. E. Box	Entomologist.
Miss V. Gray	Clerk.

The Plant Import Inspector, formerly included, has been removed to the Administrative Division of the Department of Agriculture.

Mr. Box arrived, on first appointment, on the 18th of July.

Miss Gray commenced her duties on the 2nd of May.

Correspondence.—

1,721 letters—900 inward and 821 outward—were dealt with during the year. The outward letters are summarised as follows : —

Blood-sucking Insects and Ectoparasites.	44
Cereals	12
Citrus	11
Coconut	1
Coffee	57
Flax	394
General	148
Household Insects	5
Identification of Specimens	21
Plant Imports	24
Sericulture	28
Staff	53
Stored Products	17
Vegetables and Flowers	6

Travelling .—

The days absent from Headquarters include days spent in Nairobi at Head Office, attending meetings, ex-

amining consignments of plants, beans, etc., at the Agricultural Show, visiting farms and plantations, etc.

From the figures given below, 45 per cent. of the working days of the entire staff have been taken up in work away from the Laboratory. The following is a summary :—

	Miles travelled.	Days away.	Plantations visited.
Mr. Wilkinson	3382	154	87
Mr. Box	64	15	5
Mr. Anderson	1076	69	40
	4522	238	132

Mr. Box visited the Teita Hills in connection with a report received to the effect that "borer" was doing considerable damage to coffee. This turned out to be a new pest which had not before been recorded from any of the coffee growing areas of the Colony.

The tips of the primaries and laterals were eaten into and bored by the caterpillar of a Tortricid moth, causing a state comparable to "die-back" in appearance.

Parasites have been successfully raised from this caterpillar and have been sent home for identification.

In December Mr. Box visited Njoro and found the insect damaging the wheat was the caterpillar of the Cotton Boll-worm-moth *Chloridea obsoleta, F.* This has not before been recorded from wheat in Kenya.

It was reported that cattle were dying from Trypanosomiasis on Farm 540 B, in the Laikipia district. Mr. Wilkinson visited this and neighbouring farms in July and found that no "fly" was present on farms 540B, 541B, 542B. Fourteen miles away on the river OI Arabel, at the base of Mount Ngelesha at an altitude of 5,000 to 5,600 feet, fly (*Glossina pallidipes*) was found in considerable numbers. Below 4,600 feet, on the same river, no fly was found.

The soldier seetlement area in the Sonjo Valley was surveyed in December. Mr. Wilkinson found that fly did not exist on any of the occupied farms. Ten miles

further down the valley from the last occupied farm, and two to three miles from the last settlement farm (unoccupied), No. 684, fly (*Glossina pallidipes*) was present along the whole length of the 4,800 feet contour at the foot of the Laikipia, Escarpment.

In spite of persistent reports to the contrary, it appears that Fly does not occur on the Genia river or its tributaries nor from the Thika falls along the course of the river to a point due south of Kakuzi, a distance of about eight miles.

Fly was found on the Ithanga Hills in the valley at the foot of Zongololoni at an altitude of 4,000 feet and also on Zongololoni at an elevation of 4,300 feet.

Development and Improvements.

Owing to a shortage of labour, little has been done in the way of laying out the grounds surrounding the Laboratory. This is to be regretted and it is hoped that more will be done next year.

The floor of the Museum has been covered with bitumen to counteract the damp which was spoiling the collection.

No additions, or other improvements have been made, though these are urgently required.

A Johnson Rex Dusting Outfit has been purchased, chiefly for work against the flax caterpillar, *Phytometra orichalcea,* but since its arrival there has been no opportunity of using it.

Routine.

Plant Import Inspection.

Several consignments of plants and seeds have been examined in Nairobi and several consignments examined before shipment.

The Plant Import Inspector has agreed to keep small samples of grain and pulse exported, and to notify the Division if insects do make their appearance in the samples and the dates.

Library.

Several books of reference have been added during the year and a beginning has been made to catalogue on the card index system.

Collections.

Practically the whole of the collections have been rearranged, properly numbered, labelled and indexed.

Agricultural Show, Nairobi.

An exhibit, very much on the same lines as for the Nakuru Show, was prepared. A very interesting addition, made in conjunction with the Chief Sanitation Officer, was an exhibit of the rats collected in the North Kavirondo District during the plague survey ; maps showing the distribution of the two most important rats; maps showing the distribution of plague; slides and drawings of the plague fleas *Xenopsylla cheopis* and *Xenopsylla brasiliensis.*

Students Course.

In September a short course for Settlers and others was held at Kabete. Lectures and demonstrations were given on the more important insect pests of the Colony and Protectorate and the methods to be adopted in their control.

Insects and specimens for Report.

Hundreds of specimens of insects which were doing—or suspected of doing—damage to crops or plantations have been reported on during the year. Specimens of damaged plants, etc., have also been reported on.

Some of the more important are :—

Black Borer of Coffee.—Apate monacha. The borer has a wide distribution in the Colony and although it has not been reported in any great numbers, if allowed to go on unchecked, it is capable of doing a fair amount of damage. The injection of a few drops of carbon bisulphide into the borings and plugging the openings with mud has proved effective in every case.

The Yellow headed Coffee Borer.—Dirphya usambica. Kolbe has been prevalent in one or two plantations usually when the plantation was close to the forest. This borer is also controlled by the injection of carbon bisulphide.

Flax Caterpillar.—Phytometra orichalcea. F.

In some districts this caterpillar is very well controlled by parasites and it would seem that, with suf-

ficient rainfall to ensure the quick growing of the flax, the parasites can keep the caterpillar under control. Seven or eight species of parasites have been bred and have been sent home for identification.

In other districts these parasites are not nearly so prevalent and considerable damage was done by the caterpillar.

It is very noticeable that in those districts where the conditions are not of the best for flax growing, the most damage is done.

From the experiments, made on a small scale it would seem that dusting promises to be the best method of control if done when the flax is young and whenever the caterpillars are first noticed.

Chloridea obsoleta. F., the Cotton Boll Worm has been reported damaging the seed capsules of flax, bean pods, tomatoes and the ears of wheat. It has not before been recorded in the Colony.

Parasa vivida. —Walk. The Stinging Caterpillar of Coffee, has been reported from several districts but not in any great numbers.

Gonocephalum simplex which was first recorded as damaging wheat at Njoro in 1910 has now been reported as doing considerable damage to Coffee. In one plantation, where the coffee had been stumped, the new shoots were in many cases completely ring barked by this beetle and broke over in the wind. The pest was well controlled by the use of a poisoned bait of bran and paris green sprinkled round the base of the stem. These beetles feed at night and hide in the soil round the bushes during the day. They have also been recorded climbing the bushes and eating the leaves.

Leucoptera coffeella. Stain. The Coffee Leaf Miner.

This leaf miner is common in practically every plantation and was considered to be a minor pest of coffee. In some localities, however, it has done considerable damage, young bushes being almost entirely defoliated. As the larva is located within the leaf, treatment at this stage is difficult.

A complete study of this pest has been undertaken and when ready the results will be published.

Life Histories of Insects.

The working out of the life cycle, with a view to control, is part of the ordinary routine work of the Division, but it is also experimental.

It is hardly possible to separate "routine" and "experimental" for such a Division as this.

The life histories which are at present being worked out are given below. Some of these are nearing completion, others are well on the way and it is hoped that during the present year several will be published.

Lepidoptera :—

Papilio demodocus.	Citrus Butterfly.
Chloridea obsoleta.	Cotton Boll Worm.
Phytometra orichalcea.	Flax Caterpillar.
Naroma signifera.	The Fig Moth.
Parasa vivida.	The Stinging Caterpillar.

Coleoptera :—

Bruchus obtectus.	Bean Weevil.
Rodolia iceryae.	Scale Eating Beetles.
Rodolia argodi.	Scale Eating Beetles.
Oryctes monoceros. F.	The Coconut Beetle.

Phynchota :—

Antestia lineaticollis.	The Coffee Bug.
Bagrada picta.	The Bagrada Bug.
Chrysomphalus aurantii.	Red Scab.

Hymenoptera :—

Athalia sjostedti Konow.	Turnip Saw Fly.

Fly areas.

Several areas have been investigated during the year.

It was reported that cattle were dying from Trypanosomiasis on Farm 540B, in the Laikipia district. Mr. Wilkinson visited this and neighbouring farms in July and found that no "fly" was present on farms 540B, 541B, 542B. Fourteen miles away on the river Ol Arabel, at the base of Mount Ngelesha at an altitude of 5,000 to 5,600 feet, fly (*Glossina pallidipes*) was found in considerable numbers. Below 4,600 feet, on the same river, no fly was found.

The soldier settlement area in the Sonjo Valley was surveyed in December. Mr. Wilkinson found that fly did not exist on any of the occupied farms. Ten miles further down the valley from the last occupied farm, and two to three miles from the last settlement farm (unoccupied), No. 684, fly (*Glossina pallidipes*) was present along the whole length of the 4,800 feet contour at the foot of the Laikipia Escarpment.

In spite of persistent reports to the contrary, it appears that fly does not occur on the Ginia river or its tributaries nor from the Thika falls along the course of the river to a point due south of Enkuzi, a distance of about eight miles.

Fly was found on the Ithanga Hills in the Valley at the foot of Zongololoni at an altitude of 4,000 feet and also on Zongololoni at an elevation of 4,300 feet.

A collection of *Glossina* forwarded by Dr. Beven during his Sleeping Sickness work on the Shores of Lake Victoria consisted of the following :—

Glossina palpalis	180
Glossina pallidipes	10
Glossina fusca	5

Fleas and Plague. The ecto-parasites, 247 tubes, collected by Mr. van Someren in the North Kavirondo District have been examined and a report submitted to the Principal Medical Officer. A copy of this can be forwarded, if desired.

Ticks. Collections made by Veterinary Officers have been dealt with. Lists of Identifications have been submitted and doubtful cases have been sent home for identification.

Entomological Record.

We are indebted to the Imperial Bureau of Entomology for determining many specimens sent for identification. A list is attached of the insects, new to the collection, which have been added during the year.

I have the honour to be,
Sir,
Your obedient servant,
Thos. J. Anderson,

ORTHOPTERA

LOCUSTIDAE

Euryphymus illepidus Walk.

ODONATA

AGRIONIDAE

Pseudagrion bicoerulans Martin.

HYMENOPTERA

CHALCIDAE

Lariophagus distinguendus Forst.

Chaetospila elegans Westw.

COLEOPTERA

MELYRIDAE

Hapalochrus amplipennis Har.

BUPRESTIDAE

Phlocteis quadricornis Fairm.

Steraspis semigranosa L. & G.

CANTHARIDAE

Coryna lanuginosa Gerst.

Coryna apicicornis Guer.

Lydoceras lictor Gerst.

Cyaneolytta suahela Kolbe.

Meloe atrocyaneus Fairm.

TENEBRIONIDAE

Tribolium castaneum Herbst.

CERAMBYCIDAE

Hololeprus variolosus Gerst.

Closteromerus suturalis Har.

Agaleptus quadrinotatus Pering.

LAMIIDAE

Eunidia maculiventris Thoms.

Ceroplesis hamiltoni Auriv.

Cylindrothorax heros Auriv.

Entebbia bipunctata Gahan

ANOBIIDAE

Lasioderma serricorne F.

DIPTERA

TABAIDAE

Chrysops funebris Aust.

Tabanus corax Lw.

SIMULIIDAE

Simulium neavei Roub.

ASILIDAE

Alcimus rubiginosus Gerst.
Promachus robertii Macq.
Promachus binucleatus Bezzi
Promachus breviventris Ric.
Laxinicera dasypoda Speis.
Laxinicera scopifera Speis.
Philodicus temerarius Walk.
Dysmachus porcallus Speis.
Dysmachus orientalis Ric.
Machimus ugandiensis Ric.

SYRPHIDAE

Syrphus trisectus Wied.
Syrphus cognatus Lw.
Syrphus claripennis Lw.
Xanthogramma pfeifferi Big.
Melanostoma annulipes Macq.
do var. *mauritiana* Big.
Baccha picta Wied.
Rhingia coerulescens Lw.
Phytomia curta Wied.
Phytomia fronto Lw. var *melas* Bez.
Lathyrophthalmus myiatropinus Speis.
Lathyrophthalmus melanops Karsch.
Lathyrophthalmus megacephalus Rossi.
Eumerus odliquus F.
Helophilus capensis Macq.

BOMBYLIDAE

Exoprosopa rubella Bez., sp. nov.
Exoprosopa seniculus Wied.
Exoprosopa magnipennis Bez., sp. nov.
Exoprosopa curvicornis Bez., sp. nov.
Exoprosopa brevinasis Bez., sp. nov.
Bombylius terminatus Beck.
Bombylius mollis Bez.
Sisyrophanus abdominalis Bez., sp. nov.
Systoechus mixtus Wied.

Systoechus ctenopterus Mikan.
Hyperalonia sisyphus F.
Litorrhynchus allothyris Speis.
Gonarthrus cylindricus Bez.
Lomatia melampogon Lw.
Thyridanthrax incipiens Bez., sp. nov.
Anthrax nigerrimus Bez., sp. nov.

OESTRIDAE

Oestrus ovis L.

TACHINIDAE

Sarcophaga haemorrhoidalis Fln.
Orectocera diabolus Wied., var. *hottentotus* R.D.
Chromatophanis fenestrata Villn.
Chromatophania picta Wied.
Tachinomyia longirostris Macq., var. *salmacinus* S.
Phorinia verritus Walk.
Succingulum mistum Villn.
Angiometopa spilogaster Wied.
Gonia bimaculata Wied.
Nemoraea capensis R.D.
Nemorilla cruciata Wied.
Eutachina xanthaspis Wied.
Micropalpus affinis Corti
Micropalpus jocosus Karsch
Micropalpus angulicornis Speis.
Stomatorrrhina extensa Walk.
Rhinia rugosa Big.
Rhynchomyia pictifacies Big.
Apollenia tristis Bez.
Gigamyia minor Villn.
Sarcophaga beckeri Villn.

MUSCIDAE

Musca domestica L.
Musca lusoria Wied.

ANTHOMIIDAE

Eulimnophora fascigera Stein.
Aethiopomyia albovitta Stein.
Camptotarsis annulitarsis Stein.

Dichaetomyia polita Mall, sp. nov.
Limnophora andersoni Mall. sp. nov.
Limnophora latilamellata. Mall. sp. nov.
Euspilaria fuscorufa Mall. sp. nov.
Idiopygus hirtipes Macq.
Myiospila maculinervis Mall. sp. nov.
Xenomyia atra Mall. gen. et sp. nov.

ORTALIDAE

Plagiostenopterrhina westermanni Hend.

DROSOPHILIDAE

Zaprionus vittiger Coq.

TRYPETIDAE

Dacus sphaeristicus Speis.
Dacus brevistylus Bez.

RHYNCHOTA

COCCIDAE

Ceronema grandis Laing, sp. nov.

LEPIDOPTERA

AMATIDAE.

Balacra rattrayi Rolt.
Amata consimilis Hmpsn.
Thyreutis negus Oberth.

NOCTUIDAE

Athetis pigra Guen.
Laphygma exigua Hubn.
Perigena capensis Guen.
Phytometra limbirena Guen.
Phytometra obtusisigna Walk.
Phytometra chalcytes Esp.
Antarchaea fragilis Butl.
Tarache apatelia Swinh.
Eublemma therma Hmpsn.
Eublemma acarodes Swinh.
Phloogophora discistriga Walk.
Anomis sabulifera Guen.
Achaea catella Guen.
Tathorrhynchus exsiccata Led.
Borolia tacuna Feld.
Senta sarca Hmpsn.
Tathorrhynchus homogyna Hmpsn.

Plusiodonta commoda Walk.
Lycophotia muscosa Hubn.
Hypena derasalis Guen.
Odontestia albivitta Hmpsn.
Calesia zambezita Walk.
Busseola fusca Hmpsn.
Athetis singula Motschl.
Miselia (Polia) inferior Guen.
Pendesma anysa Guen.

SPHINGIDAE
Macroglossum trochilus Hubn.

CERURIDAE
Phalera imitata Druce.
Notoxantha sesamiodes Hmpsn.

GEOMETRIDAE
Memoria approximans Warr.
Eurythecodes flavidinaria Guen.
Rhodometra sacraria L.
Omphax rhodocera Hmpsn.
Macaria lataria Walk.

PYRALIDAE
Tyndis proteanalis Hmpsn.
Tyndis mediopallens Hmpsn.
Lamprosoma indicata F.
Nomophila noctuella Schiff.
Eromene ocellea Haw.
Ancyclolomia pectinifera Hmpsn.
Marasmia trapezalis Guen.

Appendix "E"
Mycological Laboratory,
Department of Agriculture,
Nairobi
2nd February, 1922.

The Honourable,
The Director of Agriculture.

Report of the Mycologist for the period April 1st to December 31st 1921.

Sir,

I have the honour herewith to submit my report for the above mentioned period.

Staff Changes.

There were no changes in the mycological staff during the period.

Travelling.

Over 2,000 miles of travelling was done, mainly in visiting farms and in connection with experimental work. About 40 were visited. The districts to which journeys were made included Nakuru, Solai Valley, Njoro and Kericho, besides those in the vicinity of Nairobi.

Correspondence.

85 enquiries re plant diseases were dealt with in the laboratory while several plants were received for identification.

No new fungoid diseases were reported in the chief crops grown for export and in the coffee districts round Nairobi the long spell of dry weather reduced the amount of disease present. A few cases of flax wilt due to fungous attack were reported from two districts. Rusts and smuts of wheat and barley were occasionally sent in for examination but the amount of damage done was nowhere very great.

The following diseases were noted for the first time in Kenya although, with the possible exception of the Sisal Leaf Spot none is new to science.

Castor Oil	Rust due to Melampsorella Ricini.
Apple and Quince	Silver Leaf Disease apparently due to Physiological causes.

Almond	Crown Gall.
Sugar Cane	Mosaic Disease.

This disease, which was reported just before the close of the year, does considerbale damage in some parts of the world. Its cause is a mystery to science as yet, for, while it is known to be infectious no organism has so far been found in connection with it. Enquiries and observations are being made to ascertain its distribution and severity in Kenya.

Tea	Grey Blight due to Pestalozzia Theae.

Specimens have been sent to India for confirmation.

Sisal	Leaf Spot due to Leptosphaeria sp. Probably a wound parasite only.

Experimental Work.

In conjunction with the Director of Chemical Research, and Mr. Hamilton, Flax Officer, experiments have been in progress for some time with a view to discovering the cause of the unsatisfactory results obtained from water retting of flax in this country. This work is not yet complete.

While it is known that spores of the flax wilt fungus can be killed by certain fungicides it has always proved difficult to apply this knowledge to seed treatment owing to the fact that on wetting flax seed the seed coats become mucillaginous and the seeds adhere to one another in masses. Attempts have been made in the laboratory to discover an alternative treatment which would avoid the above difficulty but so far none has been found. Work on this subject will, however, be continued.

A disease, due to a species of macrosporium, which had been occasionally reported on ripening flax but which had not previously appeared at all serious, was found to cause appreciable damage to the fibre in one district last September. The fungus has been isolated in pure culture in the laboratory and experiments are being carried out to ascertain whether it is parasitic or

otherwise and to determine the conditions necessary for the fungus to cause damage.

Spraying trials on coffee were carried out against the Leaf disease. A proprietary spraying mixture was tested and compared with the "Carbide mixture" customarily recommended in this country as a spray against the above disease. The lack of rain militated against the success of the test by causing a general diminution of the disease even on bushes which had not been sprayed but, nevertheless, the latter became sufficiently infected to render comparisons possible. Although it was found possible effectively to control the Leaf disease by means of the proprietary spray the cost of the latter so far exceeded that of an equally effective concentration of the "Carbide mixture" that this spray remains still the best known for its purpose.

A certain amount of field and laboratory work was done in co-operation with the Plant Breeder. This work consisted mainly in determining the particular species of Rust occurring on the various varieties of wheat in the experimental plots at Kabete and Njoro.

Seed testing for germination and purity was also carried out, twenty-four samples, mainly flax, being dealt with during the nine months.

Routine Work.

At the short course of instruction for settlers, held at Kabete in September, four lectures were given dealing with general plant structure, fungous diseases of plants and seed testing.

A stall was prepared at the Nairobi Show in December at which about 100 fungous diseases of plants were demonstrated by means of fresh and preserved specimens, pictures and microscopic slides. A bulletin on "Fungoid Diseases of Coffee in Kenya Colony" was prepared and issued to planters during the period under review.

The usual inspection of plants imported by parcel post was carried out at the General Post Office, Nairobi, as they arrived.

General Observations.

Although no fungous disease was particularly

serious during the nine months with which this report deals, numerous possible avenues for useful research were indicated from time to time. The special physical characteristics of the Colony frequently present features which are not met with in other countries where similar crops are grown and it is evident that, not only in mycology, but also in the other branches of economic botany, there are ample problems awaiting investigation. It is, therefore, to be hoped that the time is not far distant when the colony will be sufficiently prosperous to enable more of the appointments in the Botanical Division to be filled.

I have the honour to be,
Sir,
Your obedient servant,
J. McDonald,
Mycologist.

Appendix "F".
Department of Agriculture,
Mombasa.
February, 1922.

REPORT OF THE PLANT IMPORT INSPECTOR.

The Honourable,
The Director of Agriculture.

Sir,

I have the honour to submit my annual Report for the nine months ending 31st December 1921.

Staff Changes.

I took over the duties of Plant Import Inspector on first appointment from Mr. A. H. Wilson on 18th August 1921.

Inspection of Plant and Seed Imports.

During the nine months under review 1181 packages of Plants and Seeds, valued at Fls. 30,095.93 were passed for importation into this Country ; these were fumigated here when it was considered necessary.

The following table shows the principal classes of imports with their corresponding values.

No. of Packages	Description	Value in Fls.
232	Fruit Trees	11919 09
429	Garden seeds	7505 06
205	Farm Seeds	6024 13
146	Ornamental Plants, etc.	2821 75
126	Roots and Bulbs	1052 60
36	Tree Seeds	505 60
7	Tea Seed	262 50
1181		30090 93

Fourteen packages were confiscated valued at approximately Fls. 23.50. These consisted chiefly of Citrus trees, Coffee Seed and Peach stones. Only two consignments were destroyed on account of disease.

Even allowing for the fact that the above figures only represent the Returns for a period of nine months, they show a big reduction when compared with the 8352 packages valued at Fls. 431,810.13 imported during the previous financial year. This reduction is most marked in the case of Flax Seed, only 11 bags valued at Fls. 537.00 being imported, as against 4,821 bags valued at Fls. 267,554.00 during the previous year.

Exports.

The following figures do not represent the total exports but only those for which certificates were required by the exporters.

No. of Bags	Description.	Value in Fls.
6463	Maize	39499 00
671	Beans	7759 00
112	Flax Seed	2240 00
24	Onions	400 00
7270		Fls. 49898 00

The Beans exported were for the most part of good quality and in good condition. The same however can-

not be said for the Maize, which was mostly Native grown, of mixed varieties and in many cases weevily.

I have the honour to be,
Sir,
Your obedient servant,
C. C. Sharp.
Plant Import Inspector.

Appendix "G".

ANNUAL REPORT
of the
GOVERNMENT STOCK FARM, NAIVASHA.
for the nine months ended
31st December, 1921.

The Honourable,
The Director of Agriculture.

Sir,

I have the honour to submit my Second Annual Report covering the nine months from April 1st to December 31st 1921.

The period under review has been one of considerable anxiety owing to the almost total failure of both the long and short rains, with the result that grazing for stock became gradually worse until by the end of the year nothing remained but dry stalks which broke under foot as if burnt by fire. The total rainfall measured during the nine months was 16.41 inches, nearly 6 inches of which fell during April and May. But even during these two months the showers were so intermittent that no real growth of grass resulted and the hot and drying winds which almost invariably succeeded scorched the sprouting grass seeds and prevented the making of any "bottom" to the pasture. No meadow Hay could be made so that reeds and coarse herbage from the Lake side had to be cut to provide bedding for the bulls and other stock stabled at the boma. A further small acreage of lucerne was planted but was killed by drought, so that the farm was dependent upon the eight acres sown the previous year. This yielded

well, some half dozen good crops having been saved, but at the time of writing even this is suffering from the drought and the sinking of the water in the Lake. A very good crop of maize, which was planted in April, but lay a month in the ground before germinating, went far to provide food for the bulls and other housed stock. Whilst Ensilage, made from the previous crop, proved invaluable for the milking cows. Had it not been for the great reduction made in the head of stock carried by the farm during the previous year the difficulty of feeding would have been almost insurmountable but with the existing stock—1930 head—many of which are now grazing on the Lake Farm—it is hoped to win through until the break of the long rains.

The past nine months have seen considerable progress in the restoration and reorganisation of the farm. All fences have now been repaired and in many instances entirely renewed ; old and useless buildings at the boma replaced; new sale pens built for sheep and a satisfactory reinforced concrete storage tank and drinking trough built at Kerati, as well as a similar trough at the farm buildings. All this concrete work has been carried out by farm labour at the minimum of expense. The well which was sunk near the boma has failed to fulfil expectations, the supply of water being insufficient to justify the erection of a windmill bought for the purpose, but steps are now being taken to deepen it in the hope of increasing the supply. Another possible source of supply is being investigated by the draining of the small swamp on the north eastern boundary of the farm and it is hoped in the near future to provide permanent water for at least two of the paddocks. A further acreage of land on the Lake Farm has been put under cultivation with a view to the extension of the breadth under lucerne and other forage crops. A crop of oats sown on the arable land near the boma promised well until destroyed by the drought.

CATTLE.

The extremely dry conditions have naturally had their effect upon the cattle which, although their general

health has remained good, are in lower condition than usual, whilst a number of cows have lost considerable time after calving before coming again to the bull. Following the practice of the last two years, the young bulls intended for sale have been reared on the Lake land without any additional feed, it having been proved that under these natural conditions they grow out well whilst maintaining that hard condition which fits them to go to any farm in the Colony. It is intended in future to subject all these bulls to immunisation against Redwater—Gall sickness previous to sale—a proceeding which it is confidently anticipated will be much appreciated by those who in past years have experienced considerable losses from those ailments.

Since May last regular daily records of milk production have been kept in the case of the dairy breeds and some good results have been obtained in spite of adverse weather conditions. Fuller details of these will be found under the respective breeds. The systematic milking of these cows has entailed the hand rearing of their calves. In view of the generally held belief that hand rearing cannot be successfully pursued in this country it is interesting to note that the artificially fed calves have grown out and developed better than those allowed to run with their dams. Moreover the death rate among them has been quite negligible, nor have they gone back in condition when weaned from the bucket. The work of supervising the feeding of hand-reared calves is of course much more arduous in a country in which every pint of milk has to be watched from the moment it leaves the cow until the calf has consumed it than elsewhere where white labour can be employed.

It is probably this daily prevention of milk thefts, coupled with the constant anxiety attendant upon the want of cleanliness of the utensils in use, which in the past has militated against the practice of hand-rearing quite as much as the eradication from the mind of the native that no cow can possibly give her milk unless she has a calf by her side.

Incidentally a new source of income has been tapped by this practice on the Government Farm, the cream

being sent thrice weekly to the Lumbwa Co-operative Society's Creamery to the Directors of which grateful thanks are due for the privilege.

In connection with the milking of these cattle, the want of a suitable milking shed and dairy has been much felt. Some of the old buildings at the boma have been converted into a cow shed, but as it is open to the incessant dust storms which sweep over the farm, it is far from suitable to the purpose, whilst the existing dairy built as it is partially beneath ground level and therefore lacking in means of ventilation. is totally unsuited to dairy work.

With the aid of suitable buildings which could be locked at night some, at least, of the frequent milk thefts might be prevented, whilst one might conceivably in course of time undertake experimental work in the feeding of dairy cows and in calf rearing. Until, however, some means can be devised to retain the services of boys trained to milk properly, neither milk recording nor experimental work can ever be thoroughly satisfactory. It is most disheartening to spend several months in educating a native to use both hands and to strip a cow thoroughly only to find that he soon tires of regular work and leaves one to start the whole process of teaching again a raw native.

During the nine months seventy calves were born, eighty-four head were sold and there were twenty deaths, which left 320 head of cattle on the farm on December 31st 1921. Both the Birth and Death rate compared favourably with those of previous years. Analysis of the deaths shows that four animals died of old age and five from other natural causes, two as the result of snake bite, one from an accident whilst eight were intentionally destroyed.

The process of elimination of stock unsuited to the requirements of the farm continued by the sale of cows and heifers which did not attain to the desired standard, whilst seven others were sold to the Butcher. Three Bulls and seventeen Cows and Heifers were transferred to Kabete to augment the herds of Friesland and Ayr-

shire cattle recently established there, and one bull was sent to the Masai Reserve. Twenty native working oxen received from the Uasin Gishu Farm have been of great assistance for transport purposes between the farm and Naivasha Township which being still in quarantine can be entered by no cattle that are not immune to East Coast Fever.

The Shorthorn Herd remained at about the same strength at the end as at the beginning of the nine months, for although twenty-five calves were born, twenty-two cattle were sold and six deaths occurred. The 79 head which remained on the last day of December are still a somewhat mixed collection of cattle, due to the fact that a number are grades whilst some have Lincoln Red Blood in their veins and a few are examples of the Guernsey-Shorthorn cross. One of the pure bred cows imported in 1920 died, but the remaining nine have become acclimatised and several have reared handsome calves. The herd is headed by "Springvale Chieftain" the bull imported from South Africa at the end of 1920, who has sired some promising calves. Other particularly good looking calves are the progeny of the good bull "Tamlaght Crest" bred in Scotland and sold at the December sale. Bulls by both these sires should make their mark when they come forward for sale in 1923.

This years sale representatives will be sons of the two South African-bred bulls "Rietvallei Idaho" and "Imokilly Orphan Duke".

In view of the fact that several of the cows are very aged and others are notorious for not producing a calf regularly every year, twenty-five calves from 35 cows during nine months may be considered satisfactory and the percentage during the full year should work out well. The yearling heifers are a very promising collection which will do much towards the levelling up of the herd when their turn comes to replace some of its older members. Although there have been no instances of cows not doing justice to their calves, it is useless to deny that the back breeding of the Short-

horn herd has been entirely on beef lines and few of its members show any marked indications of dairy qualities. It is hoped that in the near future some representatives of the modern dairy Shorthorn, which has proved its wonderful dual purpose attributes in other parts of the world, will be introduced so that Shorthorn breeders may be able to bear their part in the development of the dairying industry for which this Colony is believed to be destined.

The Hereford Herd was reduced in number to 39 head by the sale in December of a handsome bunch of two year old heifers as well as of several cows with Calves at foot. Attention was directed in my last report to the altogether unjustifiable remarks formerly made regarding this breed. The past nine months have accumulated additional proof with which to refute the statement that the Hereford is a slow breeder and a poor milker.

Between April 1st and December 31st eighteen out of the twenty-one cows in the herd produced living calves, one cow calved prematurely and in one instance only did a heifer fail to do justice to its calf. Fourteen head were sold and no death took place from natural causes, although an aged cow, a broken legged calf and another deformed one were dstroyed. The bull still in use is the one imported from Australia in 1917, the record of whose breeding was lost, but which it is hoped will be obtained in time for entry in the next volume of the East African Stud Book. As it has been proved that the public demand for Hereford bulls is not sufficient to justify the retention of the breed it has practically been decided that the whole herd will be offered by auction at the end of the year unless disposed of privately before the annual sale. It will be a loss to the Colony if this herd—one of the most striking examples of the success of grading up from the native—is allowed to be dispersed and it is much to be hoped that it may pass entire into the hands of some enterprising cattle man who will continue to build it up by the infusion of new blood until it will compare favourably with any col-

lection of the breed in Africa. No breed of cattle appears to be better able to withstand drought and poor grazing, for with all conditons against them last year they kept their condition in a remarkable manner and with the exception of eye trouble to which white faced cattle appear especially subject—sickness was practically unknown amongst them.

The Friesland Herd is still the largest collection of any breed on the Farm, numbering on December 31st, 102 head, consisting of 2 stud bulls, 53 cows and 47 head of young stock and calves. During the nine months from April 1st, 18 calves were born, 29 head sold and 12 consisting of two bulls and ten cows and heifers transferred to Kabete. The three deaths during the same period comprised an aged cow and a calf destroyed whilst one calf died a natural death. The famous bull "General Britz" still heads the herd with "Melrose Niklass" the young Paul Bull from South Africa as his understudy. In this connection may be mentioned the fact that the first ten sons of "General Britz" were offered for sale last December and were so much in demand that they averaged over £76 apiece with £135 as the top price. The much admired "Sheltered Vale Sir Korndyke" who was also sold last December has left behind him a number of descendents, some of which will be put before the public at the next sale. The Frieslands were the first to show signs of the effect of drought and had to be removed to the better grazing at the Lake side earlier than the other breeds, but in spite of the drought some of the cows have shewn themselves to be good milkers and it is hoped that at future sales the milk records of the dams of the bulls offered will be found useful to buyers. Since May 1921 systematic records of all yields have been kept and although not so good as they might have been under more favourable climatic conditions the following table shewing the performance of each cow under observation on December 31st may be of interest. especially as several of them are first calf heifers.

Herd No.	Name	Date of Birth.	Date of last calving	No. of Days to Dec. 31	Total yield in lbs.
56			30th April	245	7,046
39	Naivasha Dora	1919	26th May	219	4,742
12	Brakfontein Konxo	1913	3rd June	211	5,581
25	Naivasha Freda	1917	19th June	195	6,490
10	Brakfontein Witlers	1913	1st July	183	6,600
42	Naivasha Dora Segis	1917	3rd July	181	3,949
48			10th July	174	3,002
11	Brakfontein Vridaag	1913	25th July	159	5,911
66	De Grendel Beauty Segis Buringa	1919	13th Sept	109	2,562
29		1918	1st Oct	91	2,107
16	Harlens Cecelia Segis	1913	6th Oct	86	2,194
77	Bodlonfa Anne	1919	6th Oct	86	2,029
70	De Rust Caroline	1919	24th Oct	68	1,467
72	Lady Gwineffer	1917	3rd Nov	58	1,052

Note :—10 lbs. milk is equivalent to 1 gallon.)

The Ayrshire Herd numbered 35 all told at the end of the year, a further reduction having been made to its strength by the sale of 19 head and the transfer to Kabete of a Bull and five cows. Eleven calves were born and although four deaths were recorded only two could be attributed to natural causes. The Breed has again displayed its remarkable hardihood in adverse conditions having kept in good fettle throughout the dry weather and at the time of writing the cows are the only cattle that have not been moved to the Lake front. The calves by the handsome young bull "Finlayston White Raider" imported from Scotland in 1920 are in every way an improvement upon those got by his predecessor, most of whose stock has now been disposed of. As all but two of the cows forming the breeding herd are pure-

bred a bright future for the herd is confidently anticipated.

The following table will show that, although not abnormal milkers, the cows under observation at the end of the year have done their duty at the pail.

Herd No.	Name	Date of Birth.	Date of last calving	No. of Days to Dec. 31	Total yield in lbs.
17			14 July	170	3799
20	Naivasha Lass II B	1914	25 Aug	128	3230
16	Naivasha Maid IV A	1914	26 Aug	127	2784
33	Dalwats Wood Starlight	1919	28 Aug	125	2468
11	Naivasha Violet III A	1913	2 Sept	120	1737
A	(Grade)		28 Sept	94	2265
13	A Lass I B	1914	10 Nov	51	975
9	Naivasha Mirlie I A	1912	16 Nov	45	878

SHEEP.

The deficient rainfall of 1921 suited sheep well, and the nine months under review were a good and successful period from a flock masters point of view. The policy inaugurated in 1920 of systematic elimination of inferior sheep was ruthlessly pursued, and the flocks reduced to a little more than half the strength of the twelve months previously, until by the end of December there remained only 1,388 sheep of all ages on the Farm. The effect of this reduction in numbers, coupled with the systematic dosing of all sheep for internal parasites has been evident in the improvement in the general health, and even more so in the manner in which the lambs have grown out and thriven compared with those of two years ago, when the Farm was admittedly heavily overstocked.

The good effects of the regular dosing of all sheep for the eradication of Wire-Worm has been most marked, and now that this remedy is being manufactured by the Veterinary Laboratory, it is available for use by all Sheep Farmers, and cannot be too strongly recommended. Given ordinary care in the administration of the remedy and careful adherence to the printed instructions issued with it, Wire Worm infestation need no longer be feared by flock owners.

Progress is still hampered on the Government Farm by the want of many facilities for the successful management of Sheep. During the lambing season considerable difficulty is experienced in consequence of the insufficient water supply at suitable parts of the Farm, and to the necessity to "Boma" ewes and young lambs every night. Owing to the situation of the water supply, the area over which ewes with young lambs at foot can graze is very limited, and consequently both ewes and lambs suffer. The construction of a large vermin proof camp, or paddock, alongside the river is contemplated, and if funds can be found to carry out this scheme, there is but little doubt that the lambs would derive great benefit therefrom.

The want of suitable accommodation for shearing is also a very serious matter. At present the shearing is still accomplished in an open dusty shed, necessitating the baling of the wool almost as soon as the fleece is taken from the sheep's back, this rendering impossible the proper classification of the wool. The clip can never be put on the Market to the best advantage under these conditions, and consequently a considerable sum of money is probably lost annually.

Reviewing the nine months ended on 31st December, good work has been accomplished towards the formation of more uniform flocks. Lambing commenced on April 12th, the lambs, as a rule, falling strong and healthy.

In all, 437 Merino and 44 Suffolk lambs were dropped, being 71.2 per cent. of lambs to ewes in the case of the former, and 41.9 per cent. in that of the latter breed.

The very low percentage of Suffolk lambs was in all probability due to the fact that the Rams used had only arrived in the Country just previous to tupping time, and being in high show condition and totally unacclimatised, were quite unfit to do justice to themselves. In the cases of Merinos, the percentage of births was also somewhat below the average, but this too was to be expected in that the ewes were not in good condition when the Rams were put to them owing to the heavy Wire Worm infestation, whilst the Rams themselves were too old to prove active and prepotent workers.

At the commencement of the lambing, grazing was poor, but conditions improved a few weeks later with the fall of a few showers. Up to the time of weaning on November 1st, the loss of lambs amounted to 8.1 per cent., but this included a number killed by vermin and also some from theft.

These lambs were on the whole a better collection than those of the year before, and have grown out fairly well up to the time of weaning the Suffolks throw off remarkably well, but, as has been so frequently noticed in the case of British Breeds reared in this Colony, they undoubtedly require better feeding than the Merino which is better adapted to depend on natural grazing, than a breed which for many generations has been accustomed to something better than grass.

The sheep were shorn in August, somewhat earlier than had been intended, owing to a bad attack of Scab, the lambs being left until December.

The total clip amounted to 30 bales, the gross weight of which was a trifle over 95 cwt. In this connection it may be mentioned that at the sale of the 1920 clip which occurred in London during October, 19 bales realised 10 pence per pound, one bale 8 pence, and 6 bales from 4 to 6 pence per pound. The London Brokers report on this consignment stated that "The shipment was well shewn and upon examination the bulk proved to be satisfactorily classed and graded. As usual, Continental buyers were eager to obtain this class of wool, and the resulting keen competition is reflected in the prices obtained. As soon as shearing was com-

pleted, an apparently successful effort was made to eradicate the Scab with which the Farm had so long been infected. For this purpose the whole Farm was divided into sections, each section being given a full three weeks rest before any sheep were allowed on it after being dipped thrice in a special Lime and Sulphur dip. In this way the sheep after being dipped moved to clean land entirely isolated from that infected by the parasite. At the time of writing, nearly six months afterwards, no recrudescence of Scab has been observed.

The majority of the sheep were inoculated, with good results, against Blue Tongue during November, with vaccine manufactured at the Veterinary Laboratory. The actual deaths from this inoculation were well below four per cent.

At the sale held in December, 433 breeding sheep were disposed of, whilst 164 wethers were sold the week following.

At the end of 1920 seven Merino Rams were imported from South Africa. These have since been augmented by the further importation of five pure bred rams and forty ewes. Of these rams four special flock rams were bred by Mr. A. Luckoff of Graaf Reinet, to mate with the imported ewes which were bred by Mr. R. P. Kingwell of Gordonville in the Middleburg District. A special stud ram of Mr. J. S. Minaar's breeding has been obtained, the Kingwell flock having been built up on sheep purchased from Mr. Minaar, the leading Wanganella breeder of South Africa. The ram in question is of high merit, carrying a strong fleece of typical sire's wool, full of quality and character with plenty of body. As the ewes are of good quality and of pure Peppin blood, it is hoped that they will form the foundation of a stud flock, from the progeny of which it should be possible to raise the standard of the flocks of this Colony.

In order to carry on a step further, the grading of the half-breds produced by the crossing of the Karakul ram and the Native ewe, two pure bred Karakul rams

were obtained from South Africa. A number of these half bred rams were last year sent into the Native Reserves, in the hopes that an improvement in the size and quality of the Native sheep might be effected. They were also in good demand by European Farmers throughout the same period.

Goats.

The flock of grade Angoras was further reduced in numbers by the sale during the nine months of 93 head. Births numbered 39, and 13 deaths occurred, leaving a balance of 145 of all ages on the Farm at the end of the year. A good clip of Mohair was secured and sent to London for sale. At the December sale 29 rams averaged a trifle over Shs. 18 each and 50 ewes nearly Shs. 22.6d. each.

Horses.

The fine old Hunter bred stallion, Royal Fox, now entering his twentieth year is still as successful a sire as ever, scarcely any of his mares failing to breed good foals to him. Twenty one mares visited him during the nine months from April to the end of December. Two mares and three young animals were sold in December and there now remain on the Farm three blood mares and six sons and daughters of the old horse.

Donkeys.

18 births were recorded whilst 19 donkeys were sold, and four died including the aged pure bred Catalonian Jack, whose place has been taken by Nobleman, a five year old Catalonian bred by Messrs MacLennon and Buck in South Africa:

Sixty-one donkeys of all ages remained on the Farm at the end of the year.

Mules.

One mule was transferred to Naivasha from the Uasin Gishu Farm, thus bringing the total to six.

Sale.

The annual sale of surplus stock was held on December 1st, when in spite of financial depression the largest number of visitors ever seen at a Naivasha sale attended. The principal averages were as follows :—

		Average.	Highest Price.
10	Shorthorn Bulls	Fls. 570	1050
8	Shorthorn Cows and Heifers	240	350
14	Friesland Bulls	805	1350
6	Ayrshire Bulls	425	600
4	Ayrshire Heifers	145	200
1	Hereford Bull	-	155
10	Hereford Cows and Heifers	81	135
5	Horses	232	300
16	Grade Catalonian Donkeys	63	130

Staff.

To Mr. J. Forsyth upon whom has fallen the work connected with milking records as well as the care of the cattle, and to Mr. A. E. Dirks who has done good work with the sheep, my grateful thanks are due.

I have the honour to be,
Sir,
Your obedient servant,
J. D. H. Beales,
General Manager.

Appendix "H".

Department of Agriculture,
Kabete Experimentl Farm,
Kabete.
31st January, 1922.

The Honourable,
The Director of Agriculture.
Nairobi.

Sir,

I have the honour to submit herewith the fourteeth Annual Report on this farm for the period ending 31st December, 1921.

(A). *Staff List.*

James Johnson	Manager.
J. D. Ritchie	Clerk.
G. J. L. Burton	Plant Breeder.
G. M. Hamilton	Flax Instructor.
J. W. Sparrow	Agricultural Instructor.
Andrew Paterson	Farm Foreman.
J. S. D'Costa	Non-European Clerk.

Staff Changes.

Mr. Andrew J. Wilson, the late Manager, proceeded on leave, on termination of appointment, on the 16th November, 1921.

I took over charge here on the 5th November, 1921, on transfer from the Government Farm at Eldoret.

Under the retrenchment scheme, Mr. C. B. Ussher, late Horticulturalist, left on the 12th October, 1921, on termination of appointment.

Mr. C. B. Armstrong, Assistant Manager, proceeded on leave, to be spent in the Country, on the 17th October.

Mr. A. Paterson, Farm Foreman, from Eldoret, took up duty here on the 1st October.

A Mr. Rebello was appointed IV Grade Clerk on the 15th June, 1921, but was discharged on the 16th September.

Mr. M. Fernandes arrived, on trial, on the 5th November, but was discharged on the 26th. Mr. J. S. D'Costa was engaged on the 28th November, 1921.

(B). *Travelling.*

Mr. Burton, the Plant Breeder, has been absent twenty-five days on duty, visiting wheat districts, etc. Full details are ascertainable under Mr. Burton's report.

Mr. C. B. Ussher, the Horticulturist, was absent on duty for 42 days visiting various districts.

Mr. Hamilton, the Flax Instructor, was absent on duty for 122 days, grading and advising generally on flax.

Full particulars are available under Mr. Hamilton's report appended.

(C). *Correspondence.*

During the period—1st April to 31st December, 1921, 1597 Inward and 1708 Outward letters were handled, *viz.* : —

Abstract of Subjects.	Inward	Outward
Crops and Seed Applications, etc.	496	541
Stock	80	107
Labour	33	51
Stores and Accounts	662	646
Revenue	32	40
Expenditure	11	5
Hostel and Pupilage	47	48
Foodstuffs	36	36
Miscellaneous	200	234
	1597	1708

(D). *Work Done* (*Instructional*).

The following numbers of Students have been in residence at the Hostel :—

April	6
May	5
June	4
July	4
August	4
September	4
October	5
November	4
December	4

IN ALL :—A total of 17 Individual Students of whom:

2	were in residence for	3	days
2	,, do. ,,	4	,,
2	,, do. ,,	5	,,
1	was do. ,,	10	,,
1	,, do. ,,	13	,,
1	,, do. ,,	15	,,
1	,, do. ,,	16	,,
1	,, do. ,,	35	,,
1	,, do. ,,	43	,,
1	,, do. ,,	72	,,
1	,, do. ,,	91	,,
1	,, do. ,,	118	,,
1	,, do. ,,	207	,,
1	,, do. ,,	275	,,

A Daily average number of 5. Three remained in residence at 31st December, 1921.

In addition to the foregoing, 16 Settlers were in residence at the Hostel from the 3rd to the 16th September, inclusive, attending the lecture course, as under:

(D) *Work Done* ; (*Instructional*). Contd.

The following Officers gave lectures and demonstrations :—

Messrs. Harrison, Wilkinson, MacDonald, Kirkham, Barnes, Miller, Walker, Kearney, Bradshaw, Ussher, Hamilton, Armstrong and Wilson.

The course was successful and much appreciated.

(E) *Work Done* ; (Experimental).

Full details of purely experimental work will be found in the reports of the Plant Breeder and Flax Instructor, respectively.

A Pig-feeding experiment was commenced in June and accurate figures have been kept during its progress but these are not complete at the time of writing and the experiment itself may, accordingly, be a subject for a special report.

(F) *Stock.*

The condition of these, during the year, has been, on the whole, poor owing to prolonged drought and shortage of pasture.

The condition of the Bulls and Young Stock, however, has been kept up satisfactorily all the time.

One span of oxen was purchased during the year and one span was transferred from the Government Farm, Eldoret.

The Table appended gives all necessary detail.

(G) *Farm ; (Crops).*

The following plantings were carried out :—

In April, 1921, 23.35 acres of Flax were planted and, in November, 11.98 acres. Full details of this crop will be found in the Flax Instructor's Report.

WHEAT.—In April, 1921, 21.50 acres were planted :-

Cross, 13/5	5.25	acres, yielded	90 lbs. per acre
Cross, 13	5.25	acres, yielded	150 lbs. per acre
Kabete Selected	5	acres, yielded	42 lbs. per acre
Florence	6	acres, yielded	90 lbs. per acre

These yields are seriously affected by drought and birds but the grain sample was fair average quality.

The duration of the wheat crop was five months.

In November, 15.83 acres were planted :—

5.83 acres, Kabete Selected
5 acres, Cross, 13/5
5 acres, Cross, 13

Results are not obtainable but, as the drought has continued through this season also, the yields will be negligible.

MAIZE.—In April, 45.35 acres were planted comprising the following :—

VARIETY	Area	Planted	Harvested	Yield per acre
Fort Hall Hybrid	8.50 Acres	11/4/21	1/XI/21	295 lbs.
8-row Hickory King	2.2 ,,	9/4/21	Do.	161 lbs.
White Cango	0.50 ,,	Do.	Do.	363 lbs.
Iowa Silver Mine	0.50 ,,	Do.	Do.	99 lbs.
Potchefstroom Pearl	0.50 ,,	Do.	Do.	410 lbs.
10 and 12-row Hickory King	0.50 ,,	Do.	Do.	466 lbs.
8-row Hickory King	0.50 ,,	Do.	Failure (broken into by Cattle and eaten)	
Fort Hall Hybrid	8 ,,	23/5/21	Failure (drought and late Pltg.)	
White Cango	1.25 ,,	24/5/21	Failure (drought and late Pltg.)	
8-row Hickory King	10.74 ,,	6/4/21	28/X/21	1,203 lbs.
Potchefstroom Pearl	12.16 ,,	4/4/21	21/X/21	863 lbs.

KABETE EXPERIMENTAL FARM.

LIVE STOCK.—1st April to 31st December 1921.

CLASS	On hand at 1st April 1921.	Purchases; Imported and transferred	Births	Percentage Births.	Deaths.	Percentage Deaths	Transfers from	Sales	Increase	Decrease	Balance on hand at 31st December, 1921.
Pure Bred Ayrshire Bulls	0	2	—	—	—	—	—	—	2	—	2
Pure Bred Ayrshire Cows	10	4	—	—	3	28.4%	—	—	4	3	11
Pure Bred Ayrshire Calves	1	—	6	56.8%	—	—	—	—	6	—	7
Pure Bred Friesland Bulls	1	2	—	—	—	—	—	1	2	1	2
Pure Bred Friesland Cows	8	10	—	—	1	7.6%	—	—	10	1	17
Pure Bred Friesland Heifers	0	2	—	—	—	—	—	—	2	—	2
Pure Bred Friesland Calves	3	—	8	61.0%	—	—	2	—	8	2	9
Grade Friesland Cows	2	—	—	—	—	—	1	—	—	1	1
Grade Friesland Calves	—	—	1	—	—	—	—	—	1	—	1
Working Oxen	62	32	—	—	2	2.4%	—	13	32	15	79
Pigs—Berkshire Boars	2	—	—	—	—	—	—	1	—	1	1
Do. Berkshire Sows	7	—	—	—	—	—	—	3	—	3	4
Do. Berkshire Young	5	—	21	450%	4	33.0%	—	9	21	13	13
Do. Large Black Boars	2	1	—	—	—	—	—	2	1	2	1
Do. Large Black Sows	7	—	—	—	1	21.9%	—	2	—	3	4
Do. Large Black Young	0	—	37	812%	3	10.6%	—	14	23	17	20
Mules	8	2	—	—	1	12.5%	2	—	2	3	7
Horses	2	1	—	—	—	—	—	—	1	—	3
Grade Red Poll Calves	2	—	—	—	—	—	—	2	—	2	0

DEATHS PER MONTH IN LIVE STOCK.

April	:—	Nil	0
May	:—	1 Young Berkshire Sow overlaid and 1 large Black Sow destroyed by order of V.O.	2
June	:—	Nil	0
July	:—	1 Ayrshire Cow died, N.P.S ; 2 Young Berkshire Pigs overlaid ; 3 Young Large Black Pigs (Weaklings) Died	6
August	:—	1 Ayrshire Cow died Peritonitis.	1
September	:—	1 Ayrshire Cow died Septic Poisoning ; 1 Friesland Cow died—Traces of arsenical poisoning, 1 Work Ox.	3
October	:—	Nil.	0
November	:—	1 Mule destroyed by orders of Veterinary Officer.	1
December	:—	1 Work Ox died—Hoven ; and 1 Young Berkshire Pig (runt) died.	2

CAUSES OF DEATH IN LIVE STOCK ; 1st APRIL TO 31st DECEMBER, 1921.

Class of Animal.	Blood Smears Negative.	Peritonitis	Septic Poisoning	Traces of Arsenical Poisoning.	Hoven.	Overlaid.	Runts.	Destroyed by orders of V.O.	Total.
Pure Bred "Ayrshire" Cows	1	1	1	—	—	—	—	—	3
Pure Bred "Friesland" Cows	—	—	—	1	—	—	—	—	1
Working Oxen	1	—	—	—	1	—	—	—	2
Pigs, "Berkshire" Young	—	—	—	—	—	3	1	—	4
Do. "Large Black", Sows	—	—	—	—	—	—	—	1	1
Do. "Large Black", Young	—	—	—	—	—	—	3	—	3
Mules	—	—	—	—	—	—	—	1	1
Totals	2	1	1	1	1	3	4	2	15

Half an acre, only, was planted in November, for seed purposes.

(G). *Farm : (Crops)*, Contd.

Barley.

Two acres were sown in April, 1921, but this was a failure.

General.

It will be observed that this year has been disastrous as far as the growth of crops is concerned on this farm and there is nothing to show for the expenditure of a considerable quantity of seed and a large amount of labour.

The dry season has been taken advantage of to eradicate thoroughly all couch grass among the Coffee.

The area of Coffee has been extensively stumped, and a portion was cut out. The stumped area gives good promise for the future.

(H). *Development, Buildings and Improvements.*

A building on the place was adapted for the purposes of a Laboratory for the Plant Breeder.

A building, formerly used as a Tobacco Barn, has been converted into a Lecture Hall for Students.

A "Landi" has been erected for imported Labour.

A water supply was laid on to the Hostel from the well built by the Superintendent of the Kabete Reformatory.

A very considerable amount of work has been done on the road from the farm to the Station in conjunction with labour supplied by the Superintendent of the Reformatory.

(I). *General Observations and Remarks.*

Attached are two Tables giving :— under Table "A", full particulars of the weather conditions prevailing during the nine months under review ; and under Table "B", a synopsis of meteorological conditions from 1909 onwards. This last year is probably the worst on record.

The Table underneath gives details of all the sources from which our Revenue was collected :—

Summary of Revenue, 1921.

	Fls.	Cts.	Fls.	Cts.
SEEDS :—				
Barley	22	00		
Beans	3	50		
Coffee	2704	91		
Flax	370	00		
Teff Grass	17	00		
Potatoes	54	25		
Wheat	669	24		
Total for Seeds			3901	48
Fruit			65	50
Fruit Trees			20	00
MISCELLANEOUS PRODUCE :—				
Banana Suckers	27	00		
Flax Tow	4	25		
Grass Roots	26	50		
Hay	6	00		
Milk	113	72		
Pyrethrum Plants	3	75		
Sisal Poles	16	80		
Sugar Canes	280	00		
Total for Miscellaneous Produce			478	02
LIVE STOCK : —				
Pigs	1415	00		
Cattle, Oxen and Services	1190	00		
Total for Live Stock			2605	00
SALE OF STORES :—				
Sacks	83	50		
Crates	34	50		
Unserviceable Stores	15	00		
Total for Sale of Stores			133	00
Collected for "Carriage of Goods"			20	03
		Fls.	7223	03

Free Issues.

Free Issues have been made, to the following values :—

Banana Suckers	Fls.	10	00
Barley		6	50
Beans		4	66
Flax		189	66
Fruit		6	00
Fruit Trees		10	00
Grass Roots		2	00
Maize		7	74
Milk		1	75
New Zealand Flax Seed		2	00
Potatoes		2	50
Sugar Cane		57	50
Wheat		80	63
	Fls.	380	94

Kabete Hostel.

The Hostel was closed down as a boarding establishment on the 31st May, since when the Pupils in residence have been allowed to cater for themselves, except during the lecture course in September.

Labour.

Throughout the nine months, Labour has been plentiful.

From the 1st July, onwards, wages were reduced 25% for local Labour and 20% for imported Labour, in accordance with the movement instituted to reduce the local cost of production.

Towards the end of the year, the shortage of food amongst the Natives in the locality has caused them to come out readily looking for work.

Farm Requirements.

It has been pointed out in past years many times what buildings and improvements of a permanent nature we require on this farm and in view of the financial conditions prevailing, they need scarcely be pointed out once more.

I have the honour to be,
Sir,
Your obedient servant,
J. Johnston,
Manager.

Department of Agriculture,
Kabete Experimental Farm,
KABETE.
31st January, 1922.

THE HONOURABLE,
THE DIRECTOR OF AGRICULTURE.
NAIROBI.

Thro' The Manager, Kabete Farm.

Sir,

I have the honour herewith to submit my annual report for 9 months from April to Decembeer, 1921.

(A). *Staff.*

I arrived on first appointment on 31st March, 1921, and immediately took over my duties as Plant Breeder to the Department of Agriculture, devoting my attention to Wheat and Maize breeding.

Prior to my arrival in Kenya I spent a month (February 14th—March 14th. 1921) in South Africa, visiting the following Schools of Agriculture and Experimental Stations:-Elsenburg, Potchefstroom, Cedara, and Pretoria, and making myself conversant with the methods of and results obtained in breeding Maize, Tobacco, Cotton, and Wheat at these Stations.

(B). *Travelling.*

During the year I have been absent from Headquarters on duty thirty-five days. This has been spent chiefly in the Njoro district where I have sown cultures of wheat on Natai Emuin Farm and taken the requisite notes on them, visited various farms inspecting and collecting wheat and maize, and initiated milling tests at Unga Ltd.'s of the typical wheats of the country.

(C). *Correspondence.*

My correspondence has consisted of Reports on wheat in general, the wheat industry of this country, the Rust problem, and replies to fifteen enquiries reference rust-resistance and value of samples of wheat.

I have kept in close touch with authorities such as Prof. H. K. Hayes and Dr. E. C. Stackman of America who have most kindly given me their advice and the information asked for on their research into the physiological causes of rust-resistance, the hypersensitiveness of the host plant, the method of determining pres

ence or absence of Biologic strains of rust, and what is the ultimate cause of high and low yield in maize. As a result of this correspondence, and a request to the Bureau of Cereal Investigation I have obtained some most valuable varieties of wheat of the species and sub-species :—

Triticum Monocescum
„ Dicoccum
„ Vulgare
„ Compactum

Some of these should prove of the utmost use for crossing purposes.

(D & E). *Work done Experimental.*
Wheat Breeding.

During the first three weeks of April I had analysed and classified the Wheats at my disposal into 153 cultures which were then sown in the wheat-breeding cage at Kabete. By the middle of May this number had been increased to 198 and the whole amount was sown again.

Through the kind permission of Mr. W. G. Sewall of Natai Emuin Farm, I was able, in June, to sow, with the help of Mr. E. H. Wright, 118 of these cultures on his farm at Njoro.

These 198 cultures consisted of commercial varieties and pure lines selected from these varieties, also pure-lines imported from abroad.

31	were obtained from		the Plant-Breeding Division, University of Cambridge, England.
31	Do.	„	Local Settlers.
22	Do.	„	South Africa.
112	Do.	„	Kabete and the Museum, Agricultural Department, Nairobi.
3	Do.	„	Australia (Sydney).
1	Do.	„	Lincolnshire, England.

Bearing in mind the fact that rusts such as Puccinia Graminis probably contain several Biologic forms one or more different forms of which may be indigenous to each locality, so that a wheat which is resistant to rust at Kabete may not be so at Njoro, it seemed advisable

to breed wheat in as many districts as possible and study the requiremets of each district by itself. Single-handed I am able only to tackle two districts, and Kabete and Njoro have been chosen. The former is 6,000 ft. above sea-level and the soil a rich chocolate loam ; the latter 7,500 ft. above sea-level and the soil is the yellow-grey loam of the Rift Valley. The object in view then is to breed a high-yielding, good quality, early maturing wheat for Kabete district, and a similar wheat though not necessarily an early maturing one, for Njoro; and it should be borne in mind that no guarantee can be given that wheats resistant to rust at Kabete or Njoro will be so in any other district.

I was fortunate in immediately having at my disposal so many different varieties of wheat, as the greater the number of types grown the greater the chance of finding types which are rust-resistant, or which are suitable for improving rust-resistant types by hybridization.

The object in sowing these cultures was:—

(1) To discover amongst them types resistant to one or more varieties of rust ; propagate these types, and by crossing them to produce good types resistant to all forms of rust indigenous to the district under consideration.

(2) To isolate from them pure-lines which might turn out to be hereditarily superior to the rest of the culture and not merely high variants from the mean of the culture.

Within two or three months of sowing it became apparent that practically all the cultures obtained from this country were very badly mixed, so badly mixed that it may be impossible to tell which is the type corresponding to the name of the variety. To cite one example :— "Kabete Florence" only contains 2% of ture Florence; the majority of it, which consists of one type, lodged very badly at Njoro this year.

The work of this year then has been to purify varieties, select from them the best plants and discover the rust-resistant types.

Approximately 12,000 plants from these 198 cultures are now being classified according to their Botanical and Agricultural characters. This will probably result in the isolation of about 400 distinct types. The description of any of those types which, after trial, turn out to be of any economic value, would be better published in a separate paper rather than through the medium of an Annual Report.

As regards rust-resistant types a certain measure of success can be reported. Puccinia Glumarum did not appear at all at Kabete this year, but Puccinia Graminis was present in abundance. However in several cultures one particular type of wheat—obviously an impurity, and of the thin strawed, drooping-eared type—was found growing, which, though the rest of the culture was highly infected with Puccinia Graminis, was itself infected only to a very slight degree or not at all. This type when propagated in pure-lines may prove to be highly resistant to Puccinia Graminis.

Again in a culture of 100 plants of "Red Egyptian" one impurity appeared which became smothered in Puccinia Graminis ; of the surrounding plants of Red Egyptian 50% were infected to an average degree, whilst the remaining 50% were not infected at all.

In the culture of cross 13/5 individual plants show different degrees of rust-resistance.

At Njoro one variety was destroyed by Puccinia Glumarum, others were severely attacked, but several showed marked resistance. Of the Red Egyptian culture about 75% was uninfected by Puccinia Graminis whilst indivdual plants of cross 13/5 again showed different degrees of rust-resistance.

Several crosses were made at Kabete, but unfortunately the cross 13/5 parent used turned out in the end to be susceptible to Puccinia Graminis. This emphasises the well known fact that it is inadvisable to attempt crosses unless the parents are pure-lines with proved characters.

Five pure-lines of Florence were sown in the cage at Kabete during the short rains of November, and one pure-line of Nepal Barley.

Forty-four commercial varieties of wheat, obtained from Kabete Experimental Farm, were sown on 1/90th acre plots in the nursery at Kabete. Most of them were triplicated, but as yield trials they turned out a failure owing to drought, bad germination and mixture of seed. Those plots which were only slightly mixed were harvested, purified, and in November were sown at the rate of 55 lbs. to the acre in rod-rows replicated 28 times and in multiplying plots for yield trial. Owing to the severe and prolonged drought which followed very little seed will be secured to harvest.

Maize Breeding.

The process of inbreeding maize for a number of years and then crossing pure lines is likely to produce considerably higher yielding plants than the original parents.

This process was started in June and July of this year on three varieties of Maize viz. : Potchefstroom Pearl, 8 row Hickory King and certain selections I had made and sown of Fort Hall Hybrid. One of these inbred cobs of Fort Hall Hybrid is pure white except for two yellow grains and if the white grains breed true they may prove useful as one of the parents of a cross with other white varieties of Maize, the offspring of which might show marked heterosis as well as other characters such as hardiness, etc.

Cobs of Potchefstroom Pearl and Hickory King have been selected both from the field and the crib. These will be sown in ear-to-row plots and perfect-stand seed beds with a view to improving the yield of these varieties.

Other Crops.

Two varieties of Oats, Sir Douglas Haig and New Abundance imported from Lincolnshire, England, were grown during the long season at Kabete ; also four varieties of Barley—Chevalier, Standwell, Cartons No. 17 from England, and Wisconsin No. 6 from Kabete—originally brought over by the Manager of Kabete Experimental Farm from America.

These will be multiplied and then issued for trial to other districts of the country.

General Work.

With the assistance of the local millers and bakers and the Director of the Chemical Research Department, tests have been initiated with a view to determining the quality of eight typical samples of wheat grown in the country.

The baker reports that six of them were too strong by themselves, but one would prove useful as the "strong blend" in a flour. Of the other two one was a Durum the dough of which did not rise at all ; the other did the same but, although it was apparently a weak wheat, this inability to rise may have been due to the fact that it was badly rusted. A full report on these tests will appear in my next annual report.

(F). *Developments and Improvements.*

Since my arrival my laboratory on Kabete Experimental Farm has been overhauled and repaired and necessary equipment including Cabinets, Tables, Wire shelves, etc., have been installed.

A one-row drill has also been supplied.

(G). *General Observations and Remarks.*

There are three varieties of rust prevalent on wheat in this country :—

(1) Puccinia Graminis.
(2) Puccinia Glumarum.
(3) Puccinia Triticina.

The first two are dangerous, the third probably is not. Fungicides are of no avail against them and Rotations of little use. The only successful method of combating them is to breed resistant varieties of wheat. This breeding work is complicated by the probable existence of one or more different strains of the same variety of rust in each district.

Strains "1" and "2" may be present in West Kenya and strains "5" and "6" on the Plateau. Thus the same wheat which is resistant to strains "1" and "2" in West Kenya is not necessarily so with regard to strains "5" and "6" on the Plateau. In the same way a wheat resistant to rust in Australia may not be resistant when grown in India. It may also be that environmental

changes may cause physiological changes in both the host and its parasite. Though it may turn out that there are only one or two strains of each variety of rust in the whole country, it is obvious that in the ordinary way wheats must be bred in the district for which they are required and not in any other district. A simple method of determining whether there are or are not different strains (but not the number of different strains) in each district is to distribute to the districts concerned, say, one pure-line of seed which is resistant to Puccinia Graminis at Kabete and one pure-line resistant to Puccinia Glumarum at Njoro.

Vide my report on Wheat and Maize Breeding of August 8th 1921., the following breeding and experimental work should be done.

(1) *Wheat.*

(a) Hybridization and subsequent selection of good rust-resistant types at Kabete, Njoro and other districts as time and labour allow.

(b) Yield trials of varieties and the above selections in all districts concerned.

(c) Trials of pure-lines for rust-resistance in all districts concerned.

(d) Selections of pure-lines and a subsequent test as to whether the value of the mean yields of any of them is greater than that of the commercial variety.

(e) Determination of rust-resistance by inoculations.

(f) Purification of commercial varieties—12,000 Plants at Kabete and about 8,000 at Njoro are being analysed during this year and the first four months of 1922.

(2) *Maize.*

(a) Improvement of varieties by ear-to-row tests, etc.

(b) Improvement of yield by varietal crossing.

(c) Improvement of yield by inbreeding and subsequent crossing.

(d) Test of varieties in all districts concerned.

In addition to the above work there are wheat districts to be visited and their wheats collected and re-

ported on, and milling and baking tests to be supervised.

It is obvious that one man cannot accomplish all this or do even a large part of it satisfactorily. What with baking tests and tours of wheat inspection it is difficult enough to do even the breeding work at Kabete and Njoro satisfactorily, especially as all wheat varieties are so badly mixed. It is the breeding work and subsequent trials and the tests of varieties which are so important and take so much time.

I can only reiterate that with one European assistant who could be trained on the spot, not only could the present work be better done but more and important work be undertaken. It is not difficult to obtain a working knowledge, of the routine work—*i.e.*, the field assistant's work—of Plant-Breeding. In the event of my going on leave, a field-assistant trained now would be in a position to carry on the work for a few months, and prevent that calamity—namely the nullification of the work of years—which has taken place twice in the past owing to the temporary absence of the Wheat Breeder and which has done so much to place the wheat industry of this country in its present lamentable condition. This condition can be slowly improved by myself, but far more rapidly improved with the help of a field-assistant. And not merely improvement, but rapidity of improvement is what is so essential now. Unless the wheats of this country are improved at once, not only will the farmers soon cease to grow wheat owing to the absence of any market local or foreign, but local flour mills will have to shut down as they cannot be expected to mill from the wheats at their command a flour which is sufficiently good to satisfy the requirements of the bakers, who will probably turn more and more to the use of foreign flour in order to preserve their reputation with their customers.

The poor state of our wheat crop is the cause of our flour difficulties, and until local millers can buy sufficient local wheats of good and proved qualities so that they can turn out the same class of flour every day of the year—instead of a different class every month as

obtains now—it cannot be expected that the bakers will be keen to rely solely, or even to a minor degree, on local flour.

In conclusion I wish to record my appreciation of the help given me by Mr. E. H. Wright of Natai Emuin Farm, Njoro, in cultivating and harvesting for me the wheat cultures at Njoro during my absence at Kabete and to Mr. Tudhope—one of the Students on Kabete Experimental Farm—for assisting me throughout my work at Kabete and particularly for harvesting wheat cultures and help in selecting maize.

I have the honour to be,
Sir,
Your obedient Servant,
G. L. L. Burton,
Plant Breeder.

Appendix "J".
Department of Agriculture,
Box 133.
Nairobi.

The Hon'ble,
The Director of Agriculture,
Nairobi.

Sir,

I have the honour to submit the Annual Report on the Flax Section for the Nine Months ending 31st. December 1921.

Staff Organization.

The Flax Section was reorganized as from the 1st March 1921, whereby the Section was increased by the appointment of the writer (Senior Flax Officer) and Mr. Hughes (Flax Officer), to three members, one having his Headquarters at the Government Farm, Kabete, so that he would be able to supervise the Flax tests and trials, act as Flax Instructor and also carry out grading in conjunction with the Senior Flax Officer, whose Head Quarters is at the Department in Nairobi.

The remaining Officer has his Head Quarters in Eldoret, which is a suitable centre for grading, both in the Uasin Gishu and Trans Nzoia Districts. All Officers are expected to render advisory services to Growers when requested.

Returns have been called for each month from the various Scutch Mills, giving the amounts which required grading, and a programme was made out accordingly, to which Officers work. Further, grading Officers had to stencil the bales of Flax and Tow which had been graded the previous month, issuing the necessary certificates, etc.

Travelling.

All three Officers were absent from their respective Head Quarters for a total of 478 days, having paid approximately 667 visits to farms,, and 427 visits to factories, and covered approximately 14,190 miles. The periods spent at Head Quarters were necessary for Administration, Experimental work and answering correspondence.

Correspondence.

The correspondence of this Section during the year may be analysed as follows :

Flax Industry, 9 letters ; Applications for Seed, 25 ; Grading Appointments, 70 ; General and Advisory, 400 ; Flax Imports, 4 ; Linseed Oil Production, 13 ; Monthly Reports and Correspondence, 23 ; Grading Certificates Issued, 111.

Routine.

Programmes were made out each month, these being compiled in accordance with demands made on the services of Flax Officers for grading and advisory work, each Officer returning to his Head Quarters at the end of every month, when a record of the work done was sent in to the Hon. The Director of Agriculture.

Students supervised the experimental work at Kabete Farm while the Flax Officer was on tour grading and rendering advisory services.

Work done, Grading.

As detailed in the table at the end of this Report 302 tons of Flax and 212 tons of Tow were graded in the various Districts in the Colony from the 1st March 1921 to 31st December inclusive. Also a considerable amount of advisory work was called for, which necessitated visiting a good many farms at which there was no grading to be done.

Publications.

Bulletin No. 9 dealing with the Growing and Harvesting of Flax, and Bulletin No. 11 dealing with the Retting and Scutching of Flax were compiled and issued during the year. A circular giving a complete explanation of the grading scheme was also published and sent to all Producers.

Show.

All three Flax Officers were called upon to act as Judges in the Flax Section of the Agricultural Show held in Nairobi during December.

An exhibit was staged by the Section shewing samples of straw and fibre obtained from various varieties of Flax seed grown at the Kabete Experimental Farm. Also samples of linen yarn spun from Flax and Tow produced in the Colony. Samples of all the various grades both of Flax and Flax Line were on show.

Lectures.

The Flax Officer at Kabete gave two lectures and two demonstrations at the course of Agricultural instruction held at Kabete Experimental Farm. A lecture was given by each of the Flax Officers at a meeting of the Flax Association held in Nakuru on the 2nd December 1921.

Experimental Work.

Flax Officer, Kabete.

The year 1921 has been anything but satisfactory for the conducting of Flax Experiments throughout the Country and particularly at Kabete Farm. The abnormal seasons have almost nullified experiments and those results obtained cannot be said to be satisfactory. In many cases no results were obtained. The rainfall at Kabete Farm during 1921 was less than half that of the previous year and was altogether insufficient for the growth of any Flax crop either for seed or fibre.

The following are details of the Flax crop which had been sown during the nine months ending December 31st 1921.

The first seasons plantings yielded only a very indifferent crop deficient both in Fibre percentage, and seed yield. During the short rains November 1921 273 Flax manurial and 5 variety experimental plots were also planted, covering an area of 15.96 acres, the success of which is rather doubtful owing to the abnormally dry season. At the date of this report appearances pointed to very disappointing results for the second season's plantings.

The scutchings of the 1920 Flax crop was completed on 15th July 1921 and amounted to 2 tons, 13 cwts, 0 qrs, 10 lbs. Flax, and 2 tons, 0 cwts, 0 qrs, 0 lbs. of Tow.

As there was no means of baling this Flax at Kabete, arrangements were made to have the Flax and Tow baled at Messrs. McMillan Estates, Kikuyu, where, unfortunately through the accidental burning of their Flax Mill and Stores, all the Flax and Tow was destroyed.

All Flax seed available for sale has been disposed of in small quantities to Settlers, mostly for the production of seed for their following season's crop. Several applications had to be refused, as the demand was greater than the supply.

The majority of the Flax work at Kabete has been carried out by ten boys, kindly supplied by the Superindent of the Kabete Reformatory. Occasionally, when the necessity arose, extra labour was supplied by the Farm for such work as weeding, pulling and retting, etc.

During the scutching season about 25 boys, sent in by various Settlers, were trained in scutching and general Mill work.

Experimental.

Owing to the failure of the rain, practically all experiments at Kabete suffered, while in addition to this, a temporary stoppage took place on account of the repeated demands on the Flax Officer's time, visiting upcountry Settlers in an advisory capacity and carrying out the work necessarily entailed by the Flax grading scheme.

Until such times as the rains break to enable the retting process to be completed, practically all the 1921 Flax experiment records remain incomplete. The following are a few of the minor experiments begun and completed.

1. For the purpose of ascertaining the speed at which the Scutching wheels in an Irish type Mill should be driven to give best results and maximum output, six tests were carried out during April and May with different types and "rettings" of straw. The results obtained varied so much that it was evident nothing definite could be proved beyond the fact that alterations in the number of revolutions per minute are absolutely necessary when dealing with different lots and rettings of straw to obtain the best results.

2. Twelve Water retting experiments were carried out, and the results which were indifferent, were practically similar to those recorded in my last Annual Report.

3. Eight Dew Retting experiments were undertaken and completed. Results were strongly in favour of the uniform spreading of one acre of Flax on 1¼ to 1½ acres of grass land with a weekly turning carefully done.

4. Three Water retting experiments were carried out at Nakuru Lake, and also on a spring on another Farm at the edge of the Lake. The resultant Flax from the Lake retting was very white in colour, fair in yield, but possessed a peculiar dryness which increased through storage. It also seemed to deteriorate in strength, and the results generally would not warrant its continuance.

5. Four trials were made of Water retting in Magnesium water of various temperatures on a Farm at Nakuru. Retting proceeded very evenly in all four tanks, but Fibre results may be described as a failure.

6. In April of last year a system of recording costs of production on this Farm was adopted, but owing to our inability, through the failure of both long and

short rains, to get anything approaching an average crop, and the subsequent difficulty of retting, the attempt was regarded as futile.

7. The experiment of ascertaining whether Native Labour could be trained in Flax Hackling and Spinning has been in hand for the last six months.

In May 1921 an old type of Irish Spinning Wheel was obtained, on which with a month's training a fairly intelligent boy shewed signs of being capable of turning out a fairly uniform yarn although still very coarse.

Encouraged by the results obtained, a new wheel was made, and some minor alterations effected, with the result that one boy can now turn out 3,500 yds. fairly uniform 20's lea yarn in a day. Samples of our elementary results have been sent to Prof. Bradbury, Textile Institute, Belfast, for report. This report has not yet come to hand.

A contrivance for cabling yarn (from 3 to 6 ply) has been made at Kabete and results obtained from same, though far from satisfactory, are better than were anticipated.

The above combined experiment is still in progress.

8. For the purpose of determining its usefulness for soap manufacture, 5 cwts. of Flax seed was sent to Messrs, Ismailjee Jevanjee, Zanzibar, for trial in their Soap factory, but as yet their report has not come to hand.

District Notes.

Kyambu.

Although a large District, the acreage planted is largely confined to small growers who appear to still have their Flax in straw, which is accounted for by the lack of central Scutch Mills and the bad retting season. In the higher parts of this District a good sound straw has been grown in suitable seasons, though 1921 season was practically a drought throughout.

Gilgil.

This District appears to produce a heavy and good quality Flax, and in normal seasons has an excellent

rainfall, which not only gives good retting results, but conditions the straw for scutching. The average yield and strength is good, though this varies according to soils and altitude. Up to the present this District has had the highest average grades.

The 1921 season was very poor for growing and retting and the yield per acre is not expected to be high.

Nakuru.

This District which covers a very large area, produces quite a number of types of Flax owing to the various altitudes, soils and rainfalls. Though it can be said that the average quality of the Fibre in the higher parts of the District is considerably superior to that produced by the soils of the lower lying farms. On the whole the bulk of the Fibre is considered satisfactory.

Njoro.

The rainfall and altitude of this District is considered favourable for the production of Flax and during the last two years the average grades seem more uniform than in other Districts, but during 1921 certain farms were favoured with a greater rainfall than others, which should result in a greater variation of grades during 1922.

Londiani.

No Fibre has been graded from this District by the Department, though there is no doubt that it must be considered as one of the good producing centres, the altitude and climatic conditions being particularly favourable. It appears that very high yields were obtained during 1921.

Lumbwa.

This is one of the oldest Flax growing Districts in the Colony, and very favourable reports have been received on Fibre which was exported in 1920. Unfortunately however the 1921 season could not be said to be satisfactory for growing or retting. Most growers prefer to hold their stock of straw until the European markets improved.

Kericho.

The type of Flax produced in this District is not unlike Gilgil Fibre and very excellent yields and qualities have been obtained. The very heavy and prolonged rainfall being particularly suitable for Flax in all stages of its production.

Uasin Gishu and Trans Nzoia.

Speaking generally, most parts of these two large Districts have proved suitable for Flax production. As in other Districts however, the 1921 season was one of the worst experienced. For planting and retting the bulk of the 1920 straw still remaining to be treated, so that it is expected that large quantities of Fibre will be exported during 1922, providing the season is favourable for Dew retting.

General Remarks.

Markets.

The general outlook of the Flax industry in the Colony was rather depressing at the commencement of the year, as Growers had considerable stocks of Flax and Tow lying unsold in Europe from the 1919 crop. In fact it may be said that throughout the year Spinners have shewn very little interest in East African Flax. It is no doubt due to the fact that there has been sufficient stock of European Fibre to meet the lower than usual demand for yarns of all classes. Also spinners have had very little experience of Fibre produced in this Colony. During the year there has been a fluctuation of about £20 per ton in the value of B.E.A. Flax, and very little has actually been sold. Owing to the lateness of the rains in all Districts it was not until well on in the year that sowing took place ; also the prolonged dry spells were detrimental to the growing crop as also to Dew retting. This decreased the output of most mills, there being a lack of retted straw to scutch.

Retting, Scutching and Baling.

There is still a considerable quantity of the 1920 straw, and nearly all the 1921 straw to be retted and scutched. The improvement shewn in the general handling of Flax this year is remarkable, particularly in the scutching, which is accounted for by the increas-

ing number of trained boys. It is not considered that the average harvested during 1921 is less than that in 1920, and judging from samples which have already been scutched out, the yield of the 1921 straw should be higher, much will, however, depend on whether the 1922 season is favourable for Dew retting.

A great handicap lies in the fact that dew retting alone is satisfactory, Growers having had to discontinue water retting, so that the crop is doubly dependent on the season. The organization of large retting fields is rendered difficult on account of the scarcity of White supervision, and the uncertainty of the rainfall. It is most desirable that the field should be handled so that the straw is retted and stacked in such a fashion that the least possible loss is incurred in scutching. The charges for scutching and baling having been considerably reduced, it is hoped that many people who have no mills of their own will be encouraged to plant an acreage of Flax in 1922.

Co-operation.

It is fully realized that difficulties exist in many Districts which would restrict co-operation in Scutch Mills, somewhat, but it is felt that this system could be exploited successfully in many cases, so reducing the cost of production baling and general handling.

Grading.

The large number of Growers who have supported and taken advantage of the voluntary Government grading scheme for Flax and Tow, indicates that the scheme should eventually be a success though it should be pointed out that the total quantity graded is far below expectations, for this the bad season is mainly responsible. The records of percentages of grades given below will be of interest to all Growers, though it should be borne in mind that the percentages of "Below Grades" covers only that Fibre which the Department handled, there being a considerable quantity of poor Flax and Tow which Growers did not consider it profitable to have graded.

Appendix "K".

Department of Agriculture,
Box 133,
Nairobi, 1922.

The Hon'ble,
The Director of Agriculture.
Nairobi.

Sir,

I have the honour to submit my Annual Report for the Year ending 31st December 1921.

Staff.

I left the Colony in May of last year and proceeded to England and the West Indies on leave. I returned to Nairobi on 24th March 1921. It is to be regretted that the services of another Coffee Officer have not yet been obtained. I am unable to organize satisfactorily the Department's work in connection with the industry until this additional assistance is forthcoming. In order to relieve the congestion of work, the services of Mr. M. De le Poer Trench were engaged temporarily for a period of three months. He rendered the industry very valuable assistance in his tour which is detailed below.

Travelling.

During the period under review I was absent from Head Quarters for 47 days in the following Districts:-

Kyambu and Ruiru	9 days.
Nyeri	16 do.
Thika	3 do.
Koru	4 do.
Fort Ternan	4 do.
Kericho	4 do.
Lumbwa	2 do.
Nakuru	2 do.
On Uganda Rly.	3 do.
	47 days.

Apart from the duties of inspecting for the purpose of dealing with outbreaks of diseases and pests and neglected Coffee, advice has been given on the cultivation and management of the crop. Mr. M. De le Poer

Trench's tour lasting from 23rd June to the 22nd December was through the following Districts : Uasin Gishu, Trans Nzoia, Kaimosi, Nandi, Kibos, Kericho, Lower Molo, and the Rongai Valley. He visited 103 Plantations and gave 8 lectures at convenient centres.

The following is a summary of inspections from 1st April to 31st December.

	District.	No. of Plantns. Inspected	No. of Plantations infected with Fungoid Diseases nad Insect Pests.											
			Leaf Diseases.	Black Blight.	Leaf Spot Disease.	Thrips.	Scale Insect.	Antestia.	Cut Worms.	Borer.	Leaf Eating Caterpillar.	Leaf Miner Moth.		
1.	Kyambu.	154	61	13	17	40	20	17	3	1	1	120		
2.	Uasin Gishu.	40	2	1		29	1		18			20		
3.	Trans Nzoia.	40	4	8		12	8					25		
4.	Nyeri.	16	6	4			5		4			12		
5.	Kom.	11	11			6			1			11		
6.	Thika	10	7			6	2		1			5		
7.	Fort Terman.	9	7				2					7		
8.	Kericho.	11	1	1			1							
9.	Kaimosi.	5	3	1		1	1		4			3		
10.	Lumbwa.	3	2					1				2		
11.	Molo. Rongai V.	3				2								
12.	Kisumu & Kibos.	3	3											
13.	Limoru.	2		1			1							
	Totals.	307	110	29	17	96	41	18	36	2	1	205		

18 Plantations were found to be in a neglected state and were dealt with under the Diseases of Plants Prevention Regulations 1921.

Correspondence, Statistical Records and Reports.

From Statistical information obtained as at 30th June 1921, the total area planted was 33,813 acres of which there are :

From 1 to 3 years of age	13,682 acres.
3 to 6 years of age	10,349 do.
6 and over	9,782 do.
Total	33,813 acres.

This figure shows an increase of 6,000 acres over last year's Statistical Return, and there has also been a big increase in the number of new Plantations.

It wil be readily understood that this large extension has proportionally augmented the demands on the services of the Department, and it has been found necessary to curtail to a very limited number (50) the confidential reports on individual plantations inspected.

The correspondence included some 270 letters dealing with such subjects as, Shade, Manuring, Seed, Diseases, Pests, Neglected Coffee, Imports, Exports, Cultivation, etc., etc. Consignments of Hulled Cherry Coffee have been examined from time to time and certificates of quality issued in each case.

Bulletins.

During the year two Bulletins were prepared by the writer and published by the Department. The first Report on the visit to Guátemala and Costa Rica during his leave in 1920 and the second entitled "Preparation of Coffee".

Lectures.

On the 20th April a lecture on the visit to Central America was delivered before a large gathering of Coffee Planters in the Theatre Royal, Nairobi. Lectures were also given during the short course at Kabete Experimental Farm on 6th, 7th, 8th, of September. A lecture was given at Kericho to members of the Beadoc Colony.

Meetings.

Various meetings of the Coffee Planters Union were attended and useful discussions took place.

Agricultural and Horticultural Show.

On 29th December the writer assisted in judging the Coffee exhibits at the Agricultural and Horticultural Show held in Nairobi. The Judges were very pleased with the high standard of preparation, in some cases they had some difficulty in awarding the prizes owing to the uniform and even exhibits in the different classes.

Taking it all round the Coffee was not the best that Kenya can produce in a normal year, but considering the dry season the exhibits were very good. It will be hoped that Planters will take the same care in preparing their general crop for market as they have over their exhibits for this Show.

Experimental Work.

In April of 1921 a ½ bushel of Jackson's Hybrid Coffee was received from India for experimental purposes.

Half the samples were distributed as a free issue in the following Districts : Trans Nzoia, Uasin Gishu, Kyambu, Ruiru, Nyeri, Thika, and the balance was sent to Kabete Government Farm. This Hybrid is a direct cross, Arabica and Liberica, crossed back again to Arabica and selected. The seed germinated with much vitality at Kabete, and from reports received from the above named Districts the germination has been most satisfactory. Permits to import further consignments of this seed have been issued to applicants.

Manurial Trials.

It was owing to the kindness of Mr. Douglas Cooper in granting land and Coffee that the Department was able to make a start with this most important work in 1921. The following is a plan of the plots marked out in three years old Coffee and 8 year old Coffee.

Up to the end of the year, no appreciable difference was noticed between the manured plots and the unmanured plots. This is possibly due to lack of rain since the application of the manures.

Kabete Experimental Farm.

The acre of Blue Mountain Coffee yielded practically no crop this season, and the trees were not looking very healthy. The chief cause for this may be put down to the short rainfall, but at the same time the field on which the Coffee is growing has had numerous crops of Maize and other crops such as Flax taken off it before the Coffee was planted in 1915.

It was decided then to apply certain manures, and on the 20th May a dressing of Nitrolim at the rate of ½ lb. to each tree was placed in a circular furrow 8 inches deep and 18 inches from the stem of the tree, subsequently an application of Farm yard manure at the rate of 20 tons to the acre was applied.

Plot No. 12. *(8.2 acres). 11 years old.*

5.5 acres of this plot was originally spaced 6′ by 10′. This Coffee was stumped in February to 8″ from the ground, alternate trees were taken out and the spacing made 12′ by 10′. Two shoots are being trained from opposite sides of the stump and the result will be a two stem tree. The balance 2.7 acres originally spaced 8′ by 8′ remains 8′ by 8′ and one stem only will be trained. A portion of this field is planted up with Bananas as a temporary shade and when the rains are favourable Muthesia and Calparnia Aurea will be included as temporary shade and Croton Elliothanus Albizzia Moluccana, Madre de Cacao, Machaerium tipa planted as the permanent shade.

Nurseries.

Coffee nurseries have been planted to establish ten acres of Coffee for experimental purposes, the varieties are, the local type Mocha Arabica (Blue Mountain), Jackson's Hybrid, Maragogipe. The latter will only be included in the variety plot as the growing of it is not contemplated for commercial purposes.

Owing to the failure of the Blue Mountain crop at Kabete this season, no seed was distributed for planting, a small quantity is expected from Nyeri grown at the Government Forestry Nursery.

Shade Experiments.

Generally speaking the question of shading has received a great deal of attention during the year. In the past it has only been a case of discussing whether shading would be beneficial or not, but I am glad to be able to report that large areas of Coffee have been planted up with shade, chiefly of Grevilia Robusta.

Mr. M. de le Poer Trench in his Report on his visit to the Plateau, laid great stress on the importance of shading, and advised as a quick growing temporary shade, a species of Sesbania, known locally as Muthesia. Other temporary shade trees that are suggested and being tried are, Calpurnia Aurea, and a species of Milletia, "Mwangwa".

For permanent shade trees Croton Elliothanus native name, Makinduri, Albizzia Moluccana, Mugumu Mukuyu, and the Rain Tree. Some of these trees may possibly be suitable for some Districts and totally unsuitable for others, hence the necessity for trying numerous kinds. Other trees that are being tried are Ereythrina Lithosperma, Madre de Cacao, Mukinguku, Jackaranda Cedrella Tuma and Matundu. During the early part of the year a tin of Madre de Cacao seed was received from Guatemala, this seed was handed over to the Forestry Department to be germinated and the trees will eventually be planted at Kabete.

Pruning Experiments.

Certain new methods of training the plant with the object of eliminating pruning are in process of trial. At Nyeri the Double Head and the four stem system have been tried with great success, but from a lack of technical advice the four stem system is not carried out correctly. I regret to state that apparently new methods do not meet with much enthusiasm on the part of the Planter in the Colony, the usual policy being to condemn anything that is new before it has

been given a fair trial. For experimental work to be carried out successfully the co-operation of the Planter is essential.

Diseases and Pests.

Leaf Disease.

No very serious outbreak occurred during the year with the exception of two plantations in Koru, which were badly infected. On one or two plantations in Kyambu spraying was carried out.

Leaf Spot Disease.

Reported on 17 plantations in Kyambu; in nearly every case it was found on young nursery plants.

Thrips.

In Kyambu (including Ruiru and Ngong) this pest gave cause for alarm on several occasions, but a change in the weather, cold and rainy days, saved the situation and no serious damage was done.

In Mr. M. De le Poer Trench's report he states that this pest did a considerable amount of damage, especially in parts of the Trans Nzoia where they have had it periodically for four years. In the other Districts where it was reported it was observed in a mild form only.

Scale Insects.

Accompanied by the Sooty Mould are kept under control by spraying with Kerosine Emulsion, and Harbas, in many cases where it was reported the cases were very mild.

Cut Worms.

This pest continues to do a considerable amount of damage, and on plantations where no precautions were taken acres of young Coffee were Ring Marked and thus ruined.

Borers.

Reported on one plantation in Kyambu as doing a great deal of damage. Two different species of Borer were found and reported to the Entomologist, who is dealing with the matter. In the Uasin Gishu District Borers were found, but to no serious extent.

Antestin.

Seventeen cases were reported in Kyambu, but none were serious.

Leaf Eating Caterpillar.

No material damage was done to the infected trees but the Entomologist made investigations and collected specimens of the grub.

Leaf Miner Moth.

Is not treated seriously as it does not appear to do any serious damage. It might be said that it appears on every plantation in the Country.

Comparatively speaking Diseases and Pests this season have not been of a serious nature, with the exception of Cut Worms.

General.

The rainfall in the Coffee Districts of Kenya for 1921 was considerably below the average. There were practically no long rains and the short rains were a complete failure. Large areas of Coffee planted during the usually rainy season suffered considerably from the lack of moisture and exposure to the scorching sun. The crop of 1920-21 was an exceedingly heavy one, 89,850 cwt. being produced from 20,136 acres in bearing as against the output for 1919-20, 71,970 cwt. from 18,000 acres in bearing. The rains until the end of December 1920 were exceedingly good, but a large percentage of the crop had not then been gathered. The rains, generally experienced during January, February and March, failed, consequently the trees bearing a heavy crop did not have sufficient moisture to ripen the remainder of the crop. During the previous year there had been a certain amount of Leaf Disease, which together with overcropping, followed by the above mentioned drought, resulted in the trees becoming debilitated, some dying from these combined factors. The result of this was that the amount of Buni Coffee produced throughout the Country was excessive. Up to the 31st December 1921, 126 tons of Hulled Cherry Coffee were exported to Egypt and France, also the So-

mali Traders at the Coast have exported a great quantity. On the whole the crop for 1921-22 is small owing to the failure of the rains.

The plantations which had previously suffered from die-back bore practically no crops this season. On the plantations which did not bear a heavy crop in 1920-1921, it was noticed that die-back was not so severe and the crop on these Estates would have been a good one had the rains not failed.

The percentage of Floaters was in some cases as much as 75%. Owing to the abnormal season a difficulty has been experienced regarding pruning, but the best results seem to have been obtained by leaving the trees alone when in a state of debility or die-back until they have recovered from the effects and started to make new growth.

In October, Fort Ternan, Koru, and Lumbwa were visited . The crop in these Districts was very small and the bean very much below the average "Nairobi" size. The Coffee trees have not suffered to any great extent from die-back, although the rainfall in both Districts has not been up to the average. On one of the Plantations in Koru, Leaf Disease was noticed in a very bad form and the trees were suffering from the effects of this dangerous Fungus, to the extent that they were almost defoliated.

It is to be regretted that owing to a shortage of Staff more frequent visits cannot be carried out by an Officer of the Department. Mr. M. De le Poer Trench points out in his report on the Districts he visited, that many plantations have suffered damage which might have been prevented had the Settler been able to obtain technical advice as to the laying out of the plantations and dealing with pests and diseases.

Much stress has been laid on the necessity for shading Coffee, owing to the fact that hailstorms are frequent there and much damage has been caused by them. Also in certain parts the trees are also adversely affected by low temperatures and high altitudes. Wash has caused considerable loss of surface soil, and prevention has not been given sufficient attention.

It is to be hoped that in future more progress will be made and better care taken in the selection of sites and in cultivation. The conditions, especially in certain parts, appear to be particularly suitable for the growth of Coffee.

Notes on Coffee relating to the London Market.

The Coffee that reached the London Market during the Spring of 1921 was, with very few exceptions, far below the average of Nairobi Coffee. The chief characteristic was the smallness of the bean, due to the shortage of rain, and the proportion of undeveloped and defective berries, as well as the general dull appearance, must be attributed to the same cause.

During the latter part of the year there has been a distinct improvement in the quality, although not to the extent of bringing Nairobi Coffee up to the proper standard that it should reach. Nyeri and Sotik Districts have not suffered so much as other Districts and the best results have been obtained from there. There seems to be no doubt that there will always be a steady demand for good quality Nairobi Coffee.

Conclusions.

The Coffee Industry in the Colony continues to make steady progress and proves a sound investment, providing inflated prices are not paid for land and established Coffee. Rainfall records show four bad years over a period of fourteen years, averaging one bad season in every three and a half years. This most important factor should therefore be taken into consideration, when considering the capital value of Coffee as an investment, and I would repeat that there is still room for improvement in the preparation of Coffee for the London Market, as frequent criticisms are made on the standard of preparation in this Colony by the London Brokers.

I have the honour to be,
Sir,
Your obedient Servant,
A. D. le Poer Trench,
Senior Coffee Officer.

Department of Agriculture,
Mazeras.
Appendix "L".

The Hon'ble,
The Director of Agriculture,
Nairobi.

Sir,

I have the honour to submit herewith a report on Mazeras Government Experimental Farm for the nine months ending December 31st 1921.

Staff.

The labour supply has been plentiful, but attendance has been poor. Many are suffering from fever and periodic spells of illness. A supply of medicines is kept on the farm for the staff.

Since July the farm expenditure has been reduced.

Agricultural and Horticultural Show, Nairobi.

A representative exhibit was prepared, and during December was taken up to Nairobi Agricultural and Horticultural Exhibition. The exhibits were of good quality considering the poor seasons which have been experienced.

Considerable interest was shown by visitors, and numerous questions on various economic crops were dealt with. Leaflets were available for distribution, these dealt with various products such as Arrowroot, Rice, Ginger, Chillies, etc.

Rainfall.

The long rains were below the average, and as a result many native crops failed to ripen. The late, or short rains, have failed, only one or two light showers fell in the earlier weeks. Various crops were planted, these have failed, and a local shortage of produce seems likely. The natives found it difficult to obtain drinking water for their stock and losses have followed. The total rainfall for the nine months was 27.30 ins. more than half of which fell in the first two months of the period. A detailed daily record is as follows :

Date	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1.	-	0.88	-	0.07	-	0.12	0.03	-	0.16	
2.	1.28	0.08	0.06	0.07	-	0.02	-	-	0.07	
3.	0.31	Trace	-	0.30	-	-	-	-	-	
4.	0.06	-	-	-	-	0.06	-	-	0.62	
5.	0.25	-	-	0.28	-	0.03	-	-	-	
6.	0.04	-	-	-	-	-	0.01	0.01	-	
7.	0.05	0.03	-	-	-	0.03	-	0.05	0.93	
8.	Trace	0.43	-	0.14	-	-	-	-	0.01	
9.	0.05	Trace	-	-	0.40	-	-	-	0.87	
10.	-	Trace	-	0.03	-	-	-	-	-	
11.	0.45	0.26	0.06	-	-	-	-	-	-	
12.	0.64	0.95	-	-	-	-	-	-	0.11	
13.	0.00	0.08	-	0.06	-	-	-	-	-	
14	-	0.32	0.13	-	0.41	0.30	0.03	0.36	-	
15.	-	-	0.15	-	-	-	-	0.03	0.10	
16.	-	0.20	0.42	-	-	-	0.28	-	-	
17.	-	0.19	0.14	-	0.01	-	-	-	-	
18.	-	0.06	0.15	0.05	0.09	0.57	-	-	0.19	
19.	1.50	0.36	0.11	0.18	0.03	0.09	-	-	0.02	
20.	0.26	-	0.01	-	-	0.01	-	-	0.10	
21.	Trace	-	-	0.05	-	0.01	0.01	-	0.12	
22.	0.18	0.38	-	0.03	-	0.80	-	-	-	
23.	-	Trace	-	0.01	-	0.15	-	-	-	
24.	0.07	-	0.06	0.15	-	0.06	-	-	-	
25.	1.12	Trace	0.26	0.12	-	-	0.04	0.19	-	
26.	0.62	0.1'	-	-	0.03	-	0.20	-	-	
27.	1.13	Trace	0.03	-	0.01	-	0.29	-	-	
28.	1.70	0.51	0.15	-	0.01	-	-	-	-	
29.	0.43	0.36	0.06	0.29	-	0.06	-	-	-	
30.	-	0.06	-	-	-	-	-	-	-	
31.		Trace	-	0.04	0.07	-	0.03	-	-	
										T
Total	10.48	4.86	1.85	1.87	1.06	2.31	0.92	0.64	3.30	27
Days Rain	20	17	15	16	9	14	9	5	12	1
Greatest Fall	1.70	0.95	0.42	0.30	0.41	0.80	0.29	0.36	0.93	6

Maize.

Maize, "Fort Hall Hybrid" was sown in April. Owing to bad weather conditions and the attacks of Baboons and Parroquets the yield was poor, 1010 lbs. only were harvested. The many native shambas in the surrounding reserve on which poor types of Maize are grown, make it impossible to keep a good variety true to type. The natives are adverse to growing better varieties which have been offered them. Until some co-operation is shown the position cannot be improved.

Coconuts.

A selection of varieties were planted under similar conditions, with a view to obtaining data as to yield of copra, oil per cent., length of period before fruiting, etc.

Planted 1 acre. "Black" type.
1 acre. "Red" type.
1 acre. "White" type.

These are growing well considering the unfavourable season.

Sweet Potatoes.

A number of varieties from South Africa, Uganda, Diego and various other localities are under cultivation to raise sufficient stock for a comprehensive trial.

Beans.

"Rose Cocos" and Canadian Wonder were sown but did not germinate satisfactorily.

Turmeric.

A small quantity of Turmeric was secured from Winkelspruit, South Africa. This is being increased in nursery beds.

Ginger.

A few pounds of green ginger rhizomes were procured locally. Stock is being raised.

Sim-Sim.

Two acres of sim-sim were sown but failed to germinate owing to lack of rain.

Bananas.

An acre of young suckers were planted for future stock. Nine new varieties were secured, three from South Africa and six from Malindi. These are growing fairly well.

Citrus.

The Washington Naval Naartje and Zanzibar oranges were attacked by fruit fly. Lead arsenate spraying was used with good effect. The second and short rains crop of fruit are dropping from the trees, due to excessive drought. The following quantities of fruit were sold :—

Limes	1,000
Lemons	3,000
Oranges	300

Revenue.

Nursery Stock Sale.

Plants	2,200
Packets of seed	24

Miscellaneous, such as Bananas, Kapok, Sisal poles, to the value of £86.2.33cts.

Tree distribution to the value of

57 packets of seed, Rice, etc.	£2.1.00 cts.
276 Plants	8.3.93
160 Coconuts	1.4.00
(for feeding experiments to Coconut beetle).	
Total	98.0.28

The following contributions were received during the period under review from the Department of Agriculture :—

7	Varieties	Castor Oil.
10	,	Cotton.
5	„	Tobacco.
5	„	Onion Seed.
1	„	Perilla.
4	„	Cowpeas.
2	„	Turnips.
1	„	Pumpkin.

A small parcel of Avocada seed from Conway Harvey, Esq., Koru.

6 varieties Cassava from Government Farm, Kibos, nursery.

Owing to the lack of water the nursery stock is low. Citrus stocks have been raised for budding, but the weather has not been suitable so far for inserting the buds. The iron labels previously used on beetle trap work are now used for marking plots, etc., and are extremely useful. The wooden labels used previously had to be renewed periodically through the ravages of white ants.

A banda has been built for the use of the Farm Manager and is cool and comfortable. The watchman's hut has been rethatched. New timbers are required in the roof of the Stores and Tool shed.

The rain water tanks were repaired, but new guttering is required.

A permanent water supply is badly needed, and would increase the value of the Farm considerably.

There is a well on the farm, but the water is brackish.

I have the honour to be,
Sir,
Your obedient Servant,
F. B. Butler,
Ag. Manager.

Department of Agriculture,
Box 133.
Nairobi.
21st April, 1922.

THE HON'BLE,
THE DIRECTOR OF AGRICULTURE,

Annual Report on the Government Experimental Farm, Kibos, for the Nine Months ending 31st December, 1921.

Sir,

I have the honour to submit my Report on the Government Experimental Farm, Kibos, and on the Agricultural instruction work carried out for the Nine Months ending 31st December 1921.

Staff.

A Native clerk was appointed.

Rainfall and Weather Conditions.

Had there been a more even distribution of rain at the beginning of the season when the young crops stood greatly in need of it, it is considered that they would have pulled through, and the general failure which resulted been averted. The year was remarkable for the number and frequency of hailstorms which occurred. Below is a table of the rainfall for the year ending December 31st 1921.

Month	Quantity in inches	No. of days on which rain fell.	Date of Highest fall.	Greatest Fall in inches.
January	0.67	3	19th	0.52
February	3.67	8	18th	0.60
March	0.88	3	27th	0.50
April	2.09	6	6th	0.80
May	4.22	13	19th	1.15
June	4.28	12	28th	2.21
July	3.87	10	21st	1.04
August	2.60	11	12th	0.53
September	2.05	10	2nd	0.42
October	2.96	13	9th	0.69
November	3.25	12	9th	0.72
December	2.69	5	16th	1.24
	33.20	106		

Buildings.

Further housing accommodation for Native apprentices was provided.

Crop Experiments

These were more varied than in previous years. A sspecial feature was the trial of different kinds of Native food crops including varieties of Cassava, Sweet Potatoes, Mtama, etc.

Groundnuts.

Variety	Area.	Date Planted	Date Reaped	Yield per acre.	Remarks
1. Mauritius	1 acre	4-3-21	6-8-21	350 lbs.	Free from disease. Good sized nuts. Good growth.
2. Pondicherry	do.	6-3-21	6-8-21	161 lbs.	Badly attacked by disease.
3. Big Japan	Failure for the third season running.				
4. Small Japan	Comparative failure.				
5. Spanish Pea Nut	⅜ acre	6-3-21	20-8-21	570 lbs.	Somewhat diseased.
6. Virginia Bunch	a failure.				Failed due to disease.
7. Shirati	2 acres	20-3-21	23-8-21	550 lbs	No disease and matures early. No introductions have equalled this variety.

Simsim Varieties.

1. Brown	1 acre	18-4-21	3-11-21	88 lbs	Low yield, due to adverse weahter. Usually secures 200 lbs.
2. Black	1 acre	3-6-21	20-10-21	72 lbs.	First trial. Did not thrive as well as brown.
3. Brown	October plantings failed entirely				

Plot No. 10. 1 acre.

Sim Sim (*Brown*).

This is one of the recognised short rainy season crops of the Nyanza Province, but trials carried out in the drier areas have shown that it does nearly as well planted towards the end of the long rains in April or May. As a main crop it gives too low a yield to commend itself to European cultivation, but it has been found valuable as a means for sweetening new land. Owing to a shortage of rain the crop in the greater part of the Reserves was a failure. The local market price for brown Sim Sim seldom goes below Fls. 2 per Frasila of 36 lbs., and the yield in normal years under Native cultivation 180 to 200 lbs per acre.

Date of Planting	Date of Reaping	Quantity of Produce
May 18th	October 3rd.	88 lbs.

Rice.

Variety.	Area	Date Planted	Rate Reaped	Yield per acre.	Remarks.
1. Upland No. 1. (Kibos)	1 acre	11-4-21	7-8-21	140 lbs.	This variety has been under trial for 6 years. A very good rice. Attempts being made to improve yearly by selection.
2. Upland. (Nyika)	⅓ do.	21-4-21	10-8-21	210 lbs.	Heavier yields are secured in normal seasons.
do. Sindhano	do. do.	21-4-21	10-8-21	240 lbs.	
do. Ambari	do. do.		Failure		

Cotton.

1. Sunflower — Did badly, but is the standard type at Kibos imported. from Uganda eight years ago.

2. King. (S.A.)	1 acre	22-5-21	30-10-21	116 lbs.	Good growth, but compared badly in yield and fibre with Sunflower.
3. Bancroft (S.A.)		22-5-21	30-10-21	120 lbs.	Not as good as King.
4. Union (S.A.)		23-5-21	6-11-21	109 lbs.	Not vigorous, but staple long.

In addition ¼ acre plots of Nyasaland Upland, American Acala, Zululand Hybrid, and American Durango were laid down. In comparison Nyasaland Upland was best, the others were of no moment.

Maize.

Plots Nos. 18 to 25. 1 acre each

The unfavourable weather conditions already referred to, had perhaps more disastrous effects on this crop than on any other, with the result that the average yield an acre for the District fell from 8 bags in normal years to less than three, the crop did not suffer so much in the Hills.

Date of Planting	Date of Reaping	Quantity of Produce per acre
8th March	29th July	3 tons.

Plot No. 7. 1 acre.

Mombasa Chillies.

Growth was slow at first, but soon the plants established themselves, and despite the abnormal season gave a fair yield.

Date of Planting	Date of Reaping	Quantity of Produce
7 th April	29th August	320 lbs.

A crop planted in the short rains gave one third the yield.

Mtama.

Plots Nos. 26 and 27. 1 Acre each.

This experiment included eight varieties collected in various parts of the Province.

It is the most popular food crop of the Natives, and as it probably occupies three fifths of the total area under cultivation in the Reserves, a series of trials to test yields and milling qualities were started. The following are the names and descriptions of the varieties tried.

1.	Nyalando.	Reddish Brown.	Large Grain
2.	Ochuti	do. do.	do.
3.	Nyakwangoya	Purplish Brown	do.
4.	Olieko	do. do.	do.
5.	Nyasoya	do. do.	do.
6.	Nyachongirawo	do. do.	do.
7.	Njabunde	Light Brown	do.
8.	Ondiwo	do. do.	do.

There was little to choose between any of the varieties for growth in the field, though Ondiwo was slightly earlier than the others, and Njabunde by far the heaviest yeilder.

Nyalando	209 lbs.
Ochuti	325 lbs.
Nyakwangoya	157 lbs.
Olieko	283 lbs.
Nyasoya	389 lbs.
Nyachongirawo	205 lbs.
Njabunde	502 lbs.
Ondiwo	205 lbs.

Plot No. 28. 1 Acre.

Sweet Potatoes.

12 varieties from Uganda and three collected in the District. The Uganda varieties made rather rank growth throughout, but were absolute failures as croppers, not one of the vines developing even one pound of Tubers. The three Kavirondo varieties which all did very much better were named as follows :

1. Nyarhangho.
2. Nyar Kamolo.
3. Njanga

Date of Planting	Date of Reaping	Quantity of Produce	Remarks
20th May	12th Oct.	108 lbs.	Nyarhangho. White Tuber.
to		132 lbs.	Nyar Kamolo. Red Tuber.
24th May.		89 lbs.	Njaga. White Tuber.

Plot No. 29. 1 Acre.

Cassava.

There were five sweet and two bitter kinds in this experiment, as follows :—

1.	Binty Asamani.	
2.	Kondero.	
3.	Kibibi	Sweet.
4.	Shell shell.	
5.	Ndondi.	
1.	Guangwala.	Bitter.
2.	Matumbe.	

The growth of the bitter varieties were somewhat stronger than the sweet. The majority of the varieties however had not begun to tuber at the end of the season, and so no yields are available.

Liguminous Crops.

	Variety.	Area	Date Planted	Date Reaped	Yield per acre.	Remarks.
1.	Oigeon Peas	1 acre		Failure		A perennial cultivation is gradually spreading in Reserves. Should become established.
2.	Green Chiroko	do.	25-5-21	2-11-21	448 lbs.	A valuable cover crop, cultivation is extending.
3.	Black Chiroko (Dengo)	do.	21-5-21	7-10-21	600 lbs.	Less valuable than green, but hardier and a heavier yielder.
4.	Canadian Wonder Bean	do.	14-6-21	28-9-21	75 lbs.	A comparative failure. A big crop in Reserves but badly mixed.

PERMANENT CROPS.

Progress was especially noticeable in the case of fruit trees, many of which came into full bearing for the first time. Of the more important, mention may be made of the following :—

Bananas.

Of the 35 varieties introduced from Uganda the previous year, 8 were showing signs of flowering at the end of the year. Compared with the Zanzibar and Guindy varieties which have been established on the Farm for years, the majority of these new varieties, which include several cooking kinds, have done extremely well. In spite of the dry weather the Zanzibar variety maintained its excellent flavour and texture.

Sugar Cane.

Despite the rapid falling off in the price of Jaggery locally, interest in the cultivation of Sugar Cane at Kibos, far from abating, has steadily increased during the year. There is no doubt that the erection of the large sugar factory at Kibos has largely contributed to this. Another small factory has also been built.

Uba.

This is a thin hard cane, fairly prolific grower and practically immune to white ants attack.

Average yield Kibos 59 to 60 tons per acre. The internodes of this cane are very long.

Sealey Seedling.

A yellow cane, medium size, fairly immune to White Ants attack, easy to establish and possessing medium length internodes. Average yield about 45 to 50 tons. A fairly soft cane.

B.3922.

This Cane did rather poorly at first, but showed remarkable improvement on the third season, when it was propagated by tops only. The yield by this method was about 45 tons or about 5 tons more than the previous trials. A fairly long jointed white cane of medium toughness. It is very easy to establish by tops.

Uganda Canes. B4955.

These arrived at the stage of maturity during the year, but did rather badly. A thin yellow cane, fairly hard but a poor stooler.

Bourbon Purple.

A rather thick purple cane whose chief drawback is its extremely short internodes. It is hardly a Cane to recommend for extensive cultivation at Kibos.

Ceylon Cane.

A fairly thick yellow soft cane. Showed splendid growing qualities. A very long jointed cane and a good stooler.

Java Cane.

A white cane slightly thicker than the above. Did not develop so long as the Ceylon variety which aver aged 7 to 8 feet, but stooled as freely and showed equally as good field qualities as well.

D.74.

Erect growing yellow cane. Did the best of the series as far as growth in height was concerned. Good stooler and very long joints.

Native Canes.

Fairly strong grower but developed rather short Canes, inclined to be prostrate. Joints rather short yellow and soft.

Purple Barbados.

A thick vigorous growing purple cane. Erect in habit and developing good length canes with medium to long joints.

White Tana.

A strong grower closely resembling D74 in general appearance. Owing to its long internodes and erect habit is strongly recommended for cultivation.

Bourbon Yellow.

This is a thin red long jointed cane, but a poor stooler. A mistake evidently occurred in the labelling of this cane as may be assumed from the colour of the cane and the name by which it is described. It is a very much smaller and earlier cane than most.

B.156. *From the Kabete Farm.*

This proved a somewhat slow starter, but developed much faster after the first three months. A thin cane, poor stooler with fairly long joints.

Coffee.

The trees were very healthy, but produced a poor crop.

Cashew Nut.

These trees gave a heavy crop of fruit and a large number of seeds were collected for propagation.

Coconuts.

The older trees produced a fair crop of nuts of normal size. Two of the seven year old trees flowered for the first time but failed to develop fruit.

Mangoes.

From a fruiting standpoint these did by far the best of all fruit trees in the orchard.

Pawpaws.

Several of the old trees were replaced with young plants. These are making good progress.

Pine Apples.

These have not recovered. from the last drought Poor sized fruits were produced.

Sugar Apples.

These trees have now become fully established, but for some inexplainable reason only matured very few fruits, the great majortiy drying up before ripening.

Other Fruits.

A small collection of plants were received from the Mazeras Farm towards the end of the year, and are being kept in the nursery pending suitable planting weather. These include Loquat, Sour Sop, Tamarind and Mangoes.

Timber Trees.

As a source of seed for distribution in the Native Reserves and to European Settlers this plot of trees has

proved a very valuable asset. This plot includes the following now fully established.

Eucalyptus Citriodora.
Grevilia Robusta.
Cassia Florida.
Cassurina Equisitaefolia.

Labour.

This was plentiful and was mostly drawn from Maragoli (Bantu), and Kano (Luo).

Livestock.

The oxen on the Farm kept in fair condition.

Visitors.

Visits of inspection were paid by the Hon. The Director of Agriculture and the Deputy Director of Agriculture. The Administrative Officers who also paid Official visits included the Senior Commissioner and the District Commissioner of Kisumu. Arrangements were made that when the Chiefs gathered together for their quarterly meetings in Kisumu a day should be reserved for a visit to Kibos. This arrangement has proved valuable in arousing the interests of the Chiefs in the work now being carried on.

Distribution of Seeds, Plants, etc.

A special was made in connection with the Native Reserves. Apart from the seed purchased and issued, the quantity raised and distributed from the Farm showed an appreciable increase over previous years. One of the terms on which the seed was distributed was that part of the harvest should again be used in seed, and the quality of the Native crops will then, it is hoped, be improved. The following is a list of distributions.

Name of Plant, etc.	No. of Plants, etc., Potted.	Quantity of Seed.	Remarks.
Bougainvillea	75		Kisumu Township
Banana Suckers	60		Cent. Kav. District
Beans		10 lds.	do. & N. Kav.
Chillie Seeds		2 lds.	do. Kavirondo
Crotons	60		Kisumu Township
Rice Seed		20 lds	Native Reserve
Groundnuts		20 lds.	do do.
Lime	20	20 lds.	For camps Cen. Kav.
Lemons	20		do. do. do.
Mangoes	50		do. do. do.
Green Chiroko		8 lds.	Native Reserve
Black Dengu		4 lds.	do. do.
Tree seeds including Eucalyptus and Grevilia Robusta.		4 lbs.	do. do.
Tobacco		1 lb.	do. do.
Total	285	54 lds., 5 lbs.	

Agricultural Instruction Work.

The training of Natives on the Farm in improved methods of Agriculture, with a view to fitting them for Agricultural Instruction work in the Reserves was continued. During the year several of these apprentices were sent out into the Reserves to assist in instructing the Natives in the planting and general preparation of crops introduced for cultivation. One of these apprentices was also appointed Native Agricultural Instructor, Fort Hall.

I have the honour to be,
Sir,
Your obedient Servant,
H. H. Holder,
Agricultural Instructor.